NASA
Technical
Memorandum

NASA TM-103525

ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-41) LAUNCH

By G.L. Jasper and G.W. Batts

Space Science Laboratory

November 1990

(NASA-TM-103525) ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-41) LAUNCH (NASA) 67 p

N91-17224

Unclas

NASA
National Aeronautics and
Space Administration
George C. Marshall Space Flight Center

NASA
National Aeronautics and Space Administration

Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA TM-103525		

4. Title and Subtitle
Atmospheric Environment for Space Shuttle (STS-41) Launch

5. Report Date
November 1990

6. Performing Organization Code

7. Author(s)
G.L. Jasper and G.W. Batts*

8. Performing Organization Report No.

10. Work Unit No.

9. Performing Organization Name and Address
George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

11. Contract or Grant No.

13. Type of Report and Period Covered
Technical Memorandum

12. Sponsoring Agency Name and Address
National Aeronautics and Space Administration
Washington, DC 20546

14. Sponsoring Agency Code

15. Supplementary Notes
Prepared by Space Science Laboratory, Science and Engineering Directorate.

*New Technology Incorporated, Huntsville, Alabama.

16. Abstract

This report presents a summary of selected atmospheric conditions observed near space shuttle STS-41 launch time on October 6, 1990, at Kennedy Space Center, Florida. Values of ambient pressure, temperature, moisture, ground winds, visual observations (cloud), and winds aloft are included. The sequence of prelaunch Jimsphere-measured vertical wind profiles is given in this report. The final atmospheric tape, which consists of wind and thermodynamic parameters versus altitude, for STS-41 vehicle ascent has been constructed. The STS-41 ascent atmospheric data tape has been constructed by Marshall Space Flight Center's Earth Science and Applications Division to provide an internally consistent data set for use in postflight performance assessments and represents the best estimate of the launch environment to the 400,000-ft altitude that was traversed by the STS-41 vehicle.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
STS-41 Launch Atmospheric Summary Pressure, Temperature, Relative Humidity Winds, Winds Aloft, Clouds Space Shuttle	Unclassified – Unlimited Subject Category 46

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of pages	22. Price
Unclassified	Unclassified	46	NTIS

NASA FORM 1626 OCT 86

For sale by the National Technical Information Service, Springfield, VA 22161-2171

ACKNOWLEDGMENTS

The authors wish to thank the personnel of NASA Kennedy Space Center (KSC), along with those at the Cape Canaveral Air Force Station and their Computer Sciences Raytheon contractors, for the acquisition and distribution of all related KSC atmospheric data received at MSFC.

Thanks are due to Calvin Prather and Janice Bijvoet of Sverdrup Technology Inc. for their help in extracting atmospheric data that are used in this report. Appreciation is also expressed to Kimberly Wilkie of NTI for the computer support in attaining pad measurements.

TABLE OF CONTENTS

		Page
I.	INTRODUCTION	1
II.	SOURCES OF DATA	1
III.	GENERAL SYNOPTIC SITUATION AT LAUNCH TIME	2
IV.	SURFACE OBSERVATIONS AT LAUNCH TIME	2
V.	UPPER AIR MEASUREMENTS DURING LAUNCH	2
	A. Wind Speed	2
	B. Wind Direction	3
	C. Prelaunch/Launch Wind Profiles	3
	D. Thermodynamic Data	3
	E. SRB Upper Air and Surface Measurements	3
REFERENCES		36

PRECEDING PAGE BLANK NOT FILMED

LIST OF ILLUSTRATIONS

Figure	Title	Page
1.	Surface synoptic chart 13 min after the launch of STS-41	26
2.	500 mb map 13 min after the launch of STS-41	27
3.	GOES-7 visible imagery of cloud cover 14 min after the launch of STS-41 (1201 u.t., October 6, 1990). 500-mb heights (meters) and wind barbs are also included for 1200 u.t.	28
4.	Enlarged view of GOES-7 visible imagery of cloud cover taken 14 min after the launch of STS-41 (1201 u.t., October 6, 1990). Surface temperatures, isobaric parameters, and wind barbs for 1200 u.t. are also included	29
5.	Scalar wind speed and direction at launch time of STS-41	30
6.	STS-41 prelaunch launch Jimsphere-measured wind speeds (ft/s)	31
7.	STS-41 prelaunch launch Jimsphere-measured wind directions (degrees)	32
8.	STS-41 prelaunch/launch Jimsphere-measured in-plane component winds (ft/s). Flight azimuth = 90 degrees	33
9.	STS-41 prelaunch/launch Jimsphere-measured out-of-plane component winds (ft/s). Flight azimuth = 90 degrees	34
10.	STS-41 temperature profiles versus altitude for launch (ascent)	35

LIST OF TABLES

Table	Title	Page
1.	Selected atmospheric observations for the flights of the space shuttle vehicles	4
2.	Systems used to measure upper air wind data for STS-41 ascent	7
3.	KSC surface observations at STS-41 launch time	8
4.	STS-41 prelaunch through launch KSC pad 39B atmospheric measurements	9
5.	STS-41 ascent atmospheric data tape	10

TECHNICAL MEMORANDUM

ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-41) LAUNCH

I. INTRODUCTION

This report presents an evaluation of the atmospheric environmental data taken during the launch of the space shuttle STS-41 vehicle. This space shuttle vehicle was launched from pad 39B at Kennedy Space Center (KSC), Florida, on a bearing of 90-degrees east of north, at 1147 u.t. (0747 e.d.t.) on October 6, 1990.

This report presents a summary of the atmospheric environment at launch time (L + 0) of the STS-41, together with the sequence of prelaunch Jimsphere-measured winds-aloft profiles from L–3.95 h through liftoff. The general atmospheric situation for the launch and flight area is described, and surface and upper level wind thermodynamic observations near launch time are given. Since a ship was unavailable for STS-41 duty, the solid rocket booster (SRB) descent impact atmospheric data were not taken. However, one can use the STS-41 ascent data for SRB studies as the best substitute.

Previous MSFC-related launch vehicle atmospheric environmental conditions have been published as appendix A of individual MSFC Saturn Flight Evaluation Working Group reports [1]. Office memorandums have been issued for previous flights giving launch pad wind information. A report has also been published [2] which summarizes most launch atmospheric conditions observed for the past 155 MSFC ABMA-related vehicle launches through SA-208 (Skylab 4). Reports summarizing ASTP, STS-1 through STS-31 launch conditions are presented in references 3 through 31, respectively. Table 1 gives the atmospheric L + 0 launch conditions for all the space shuttle missions.

II. SOURCES OF DATA

Atmospheric observational data used in this report were taken from synoptic maps made by the National Weather Service, plus all available surface observations and measurements from around the launch area. Upper air observations were taken from balloon-released instruments sent aloft from Cape Canaveral Air Force Station (CCAFS). High-altitude winds and thermodynamic data were measured by a Super-Loki rocketsonde launched from the CCAFS. Table 2 presents a listing of systems used to obtain the upper level wind profiles used in compiling the final ascent atmospheric data tape. Data cutoff altitudes are also given in table 2.

III. GENERAL SYNOPTIC SITUATION AT LAUNCH TIME

A weak stationary front stretched eastward across northern Florida during the launch of STS-41. Scattered light rain showers were reported over the KSC area 3 to 4 hours prior to liftoff. These showers rapidly dissipated in less than an hour. The surface winds were moderate and easterly, and figure 1 presents the surface map 13 min after the launch of STS-41. The flow aloft was dominated by light northerly winds, and figure 2 shows the winds aloft condition at the 500-mb level 13 min after the launch of STS-41.

Clouds were scattered over the KSC region prior to the launch. Figure 3 depicts the GOES-7 visible picture at 1201 u.t. (14 min after liftoff) with the 500-mb heights and wind barbs superimposed. Figure 4 presents an up-close visible shot of the Florida peninsula as recorded by GOES-7 taken also at 1201 u.t.

IV. SURFACE OBSERVATIONS AT LAUNCH TIME

Surface observations at launch time for selected KSC locations are given in table 3. Included are pad 39B, shuttle runway, and CCAFS balloon release station observations. Neither precipitation nor lightning was observed at launch time.

Table 4 presents pad 39B wind data along with other standard hourly atmospheric measurements and sky observations for the 6-h period prior to launch of STS-41. Values for wind speed and direction are given for the 18-m (60-ft) pad light pole level.

V. UPPER AIR MEASUREMENTS DURING LAUNCH

The FPS-16 Jimsphere (1202 u.t.), MSS Rawinsonde (1105 u.t.), and Super-Loki Robin (1245 u.t.) systems were used to measure the upper level wind and thermodynamic parameters for STS-41 launch. At altitudes above the rocket-measured data, the Global Reference Atmosphere Model (GRAM) [32] parameters for October KSC conditions were used. A tabulation of the STS-41 final atmospheric data for ascent is presented in table 5 which lists the wind and thermodynamic parameters versus altitude. A brief summary of parameters is given in the following paragraphs.

A. Wind Speed

At launch time, winds speeds were 23.6 ft/s (14.0 kn) at 60 ft and increased to a maximum of 39.7 ft/s (23.5 kn) at 4,500 ft (1,372 m). Winds speeds generally decreased above this level and began to increase consistently at 28,400 ft (8,656 m). The wind speed reached a maximum of 86.3 ft/s (51.1 kn) at the 41,300-ft (12,588-m) altitude. Wind speeds decreased above this level until the

139,000-ft (42,367-m) altitude where they began to increase. The last maximum wind speed was 178.9 ft/s (105.9 kn), and this speed occurred at the 234,000-ft (71,323-m) level. Figure 5 depicts a complete wind versus altitude profile specifying wind speed on the left side.

B. Wind Direction

At launch time the 60-ft wind direction was from the east (090°) shifting through northeast to a resulting northerly direction at 13,900 ft (4,237 m). The wind direction oscillated above this level from north to east northeast until becoming northwesterly at the 19,500-ft (5,944-m) altitude. Winds were shifting from northwest to westerly up to the 60,000-ft (18,288-m) level where winds took on an easterly component. Winds fluctuated above this level and ended with a westerly component at the last measurable wind direction which was at 272,000 ft (82,906 m). The right side of figure 5 gives the complete wind direction versus altitude profile.

C. Prelaunch/Launch Wind Profiles

Prelaunch/launch wind profiles given in figures 6 through 9 were measured by the Jimsphere FPS-16 system. Data are shown for four measurement periods beginning at L–3.95 h and extending through L + 15 min.

The wind speed and direction profiles for the 3.95-h period prior to and including L + 15 min are shown in figures 6 and 7. The in-plane (head-tail wind) and out-of-plane (left-right crosswind) profiles are given in figures 8 and 9. Below 30,000 ft the in-plane component wind speeds were greater than the October mean head wind component values. Above 30,000 ft the in-plane component wind speeds were less than the October mean head wind component values. The out-of-plane component wind speeds were mostly less than the October mean right crosswind component values.

D. Thermodynamic Data

The thermodynamic data, taken at STS-41 launch time, consisted of atmospheric temperature, dew-point temperature, pressure, and density. These data have been compiled as the STS-41 ascent atmospheric data and are presented in table 5. Missing data is indicated by –9999.00 in table 5. The vertical structure of temperature and dew-point temperature for STS-41 ascent are shown graphically versus altitude in figure 10.

E. SRB Upper Air and Surface Measurements

As has been mentioned in the introduction, since there was no ship available, an SRB descent atmospheric data tape has not been constructed. The tabular values for the ascent atmospheric tape, as presented in table 5, should be used for SRB descent/impact studies since it is the closest measured data source.

Table 1. Selected atmospheric observations for the flights of the space shuttle vehicles.

Vehicle Data[h]				Surface Observations					Inflight Conditions Max. Wind Below 60,000 ft			Count Down and Launch Comments of Meterological Significance
				Thermodynamic[a]			Wind[b]					
Seq. No.	Vehicle No.	Launch Date	Time (EST) Nearest Minute	Press.[c] N/cm^2	Temp. (°C)	Rel. Hum. (%)	Speed (ft/s)	Dir. (°)	Alt. (ft)	Speed (ft/s)	Dir. (°)	
1	STS-1 Columbia	4/12/81	0700	10.234[d]	21	82	11.8 15.2	125 120	44,300	98	250	
2	STS-2 Columbia	11/12/81	1010	10.166	23	61	27.0 27.0	345 355	36,300	158	286	
3	STS-3 Columbia	3/22/82	1100	10.160	24	71	7.0[e] 8.0[e]	50[e] 145[e]	45,000	119	250	Wind directional change observed at Pad just prior to L+0. Onset of sea breeze.
4	STS-4 Columbia	6/27/82	1100[f]	10.200	29	70	5.8[g] 4.9[g]	133[g] 141[g]	47,900	37	329	
5	STS-5 Columbia	11/11/82	0719	10.227	22	68	22.0 35.0	90 90	40,600	146	336	
6	STS-6 Challenger	4/4/83	1330	10.183	23	55	12.7 16.4	63 55	46,100	155	277	
7	STS-7 Challenger	6/18/83	0733[i]	10.146	25	80	5.9[e] 10.3[e]	10[e] 350[e]	45,900	76	278	
8	STS-8 Challenger	8/30/83	0232[f]	10.111	24	97	8.8 14.0	269 268	45,100	30	349	17-min countdown delay due to adverse weather conditions.
9	STS-9 (SL-1) Columbia	11/28/83	1100	10.153	24	83	19.1 32.0	183 190	47,100	117	252	
10	STS-11 (41-B) Challenger	2/3/84	0800	10.173	17	75	0.0 NA	0 NA	39,200	143	288	
11	STS-13 (41-C) Challenger	4/6/84	0658	10.149	16	56	21.5 18.6	320 275	37,700	176	289	
12	STS-41D Discovery	8/30/84	0842[f]	10.172	28	81	3.0 3.6	106 39	40,300	44	270	
13	STS-41G Challenger	10/5/84	0703[f]	10.210	23	60	16.5 14.8	73 58	40,600	78	303	
14	STS-51A Discovery	11/8/84	0715	10.227	20	59	23.0 31.1	24 10	33,100	131	272	1-day delay due to excessive wind loads, calculated at high altitudes.
15	STS-51C Discovery	1/24/85	1450	10.173	18	46	17.1 15.5	228 253	42,900	199	265	1-day delay due to extreme cold surface temperatures.

Table 1. Selected atmospheric observations for the flights of the space shuttle vehicles (continued).

Vehicle Data[h]				Surface Observations					Inflight Conditions Max. Wind Below 60,000 ft			Count Down and Launch Comments of Meteorological Significance
				Thermodynamic[a]			Wind[b]					
Seq. No.	Vehicle No.	Launch Date	Time (EST) Nearest Minute	Press.[c] N/cm^2	Temp. (°C)	Rel. Hum. (%)	Speed (ft/s)	Dir. (°)	Alt. (ft)	Speed (ft/s)	Dir. (°)	
16	STS-51D Discovery	4/12/85	1359	10.257	21	55	19.9 22.3	82 82	42,600	134	265	55-min delay due to a ship in the SRB impact area, and concerns over potential weather related impacts (cloud cover).
17	STS-51B Challenger	4/29/85	1202[f]	10.128	27	65	11.5 18.4	005 337	32,900 40,700	68 68	320 297	
18	STS-51G Discovery	6/17/85	0733[f]	10.201	23	91	2.9 11.8	201 206	40,100 46,700	55 55	298 302	
19	STS-51F Challenger	7/29/85	1700[f]	10.174	28	72	14.9 13.4	101 113	48,000	53	035	
20	STS-51I Discovery	8/27/85	0658[f]	10.225	24	86	14.2 16.6	073 070	41,000	43	123	(20) 8/24 launch scrub due to unexceptable weather in launch area. Rain during countdown.
21	STS-51J Atlantis	10/3/85	1115[f]	10.185	28	79	17.0 13.7	213 171	48,000	48	283	(24) 1/7 launch scrub due to unexceptable weather at TAW sites. 1/10 launch scrub due to heavy rain in launch area.
22	STS-61A Challenger	10/30/85	1200	10.059	28	72	12.7 14.1	217 174	43,000	81	218	
23	STS-61B Atlantis	11/26/85	1929	10.202	23	81	10.1 10.4	165 112	49,300	75	270	(25) 1/26 launch scrub due in part to potential bad weather associated with frontal passage. 1/27 launch scrub due in part to strong cross winds at X68. 1/28 2-hr delay due in part to cold early morning temps.
24	STS-61C Columbia	1/12/86	0655	10.206	12	84	15.4 18.6	323 342	40,000	221	263	
25[j]	STS-51L[i] Challenger	1/28/86	1138	10.253	3	27	20.1 15.3	331 262	42,000	174	264	
26[j]	STS-26 Discovery	9/29/88	1137[f]	10.182	29	56	13.7 13.5	058 047	53,100	44	304	(26) 1-hr and 37-min delay due to light winds.
27[j]	STS-27 Atlantis	12/2/88	930	10.270	14	50	25.5 22.0	314 352	40,200	187	245	(27) 1-day delay due to excessive wind loads, calculated at high altitudes.
28[j]	STS-29 Discovery	3/13/89	957	10.190	18	78	16.9	242	45,200	105	283	(28) 2-hr delay due to fog and strong winds aloft.
29[j]	STS-30 Atlantis	5/4/89	1437[f]	10.200	26	57	21.6	106	44,200	157	255	(29) 59-min delay due to cloud cover over the launch area.

Table 1. Selected atmospheric observations for the flights of the space shuttle vehicles (continued).

Vehicle Data[h]				Surface Observations					Inflight Conditions Max. Wind Below 60,000 ft			Count Down and Launch Comments of Meteorological Significance
				Thermodynamic[a]			Wind[b]					
Seq. No.	Vehicle No.	Launch Date	Time (EST) Nearest Minute	Press.,[c] N/cm^2	Temp. (°C)	Rel. Hum. (%)	Speed (ft/s)	Dir. (°)	Alt. (ft)	Speed (ft/s)	Dir. (°)	
30[j]	STS-28 Columbia	8/8/89	0837[f]	10.120	27	80	12.5	252	24,100	35	286	
31[j]	STS-34 Atlantis	10/18/89	1254[f]	10.152	30	52	13.5	193	45,800 47,100	61 61	287 294	(31) 1 day delay due to rain showers in launch area.
32[j]	STS-33 Discovery	11/22/89	1924	10.132	19	80	16.9	208	41,900	110	237	
33	STS-32 Columbia	1/9/90	0735	10.194	12	100	6.8	246	43,800	160	242	(33) 1-day delay due to cloud cover over the launch area.
34	STS-36 Atlantis	2/28/90	0250	10.268	18	71	23.6	72	41,600	177	289	(34) 6-day delay due to crew illness and various weather conditions.
35[j]	STS-31 Discovery	4/24/90	0834[f]	10.186	22	63	18.6	80	31,300	96	307	(35) 2-week delay due to failure of an auxiliary power unit.
36[j]	STS-41 Discovery	10/6/90	0747[f]	10.176	27	73	23.6	90	41,300	86	293	

a. Pad 39A thermodynamic measurements taken at approximately 1.2 m (4 ft) above natural grade at camera site No. 3.
b. 1-min average prior to L+0 of 60-ft PLP winds measured above natural grade. 275-ft FSS wind measurements were not available after sequence No. 27.
c. Pressure measurement applicable to 21 ft above MSL unless otherwise indicated.
d. Pressure measurement applicable to 14 ft above MSL.
e. 10-sec average prior to L+0.
f. Eastern daylight time.
g. 30-sec average prior to L+0.
h. All vehicles launched from LC 39A except where noted.
i. Shuttle exploded in flight.
j. Vehicle launched from 39B.

Table 2. Systems used to measure upper air wind data for STS-41 ascent.

Type of Data	Date: October 6, 1990		Portion of Data Used			
	Release Time		Start		End	
	Time (u.t.) (hr:min)	Time After L+0 (min)	Altitude m (ft)	Time After L+0 (min)	Altitude m (ft)	Time After L+0 (min)
FPS-16 Jimsphere	12:02	15	6 (21)	15	16,154 (53,000)	68
MSS Rawinsonde	11:05	-42	16,459 (54,000)	12	30,175 (99,000)	57
Super-Loki Rocketsonde (Robin)	12:45	58	82,906 (272,000)	58	30,480 (100,000)	61

Table 3. KSC surface observations at STS-41 launch time.

Location[a]	Time After L+0 (min)	Pressure (MSL) N/cm² (psia)	Temperature K (°F)	Dew Point K (°F)	Relative Humidity (%)	Visibility km (miles)	Sky Cover			Wind	
							Cloud Amount	Cloud Type	Height of Base Meters (ft)	Speed ft/s (kt)	Direction (°)
NASA Space Shuttle Runway X68[e] Winds Measured at 10.4 m (34 ft)	1	10.183 (14.769)	297.6 (76.0)	293.7 (69.0)	80	16 (10)	2 1	Cumulus Altocumulus	914 (3,000) 2,134 (7,000)	6.8 (4.0)	090
CCAFS XMR[c] Surface Measurements	0	10.180 (14.765)	300.4 (81.0)	294.3 (70.0)	70	16 (10)	2 1	Cumulus Altocumulus	853 (2,800) 3,658 (12,000)	13.5 (8.0)	110
Pad 39B[d] Lightpole SE 18.3 m (60.0 ft)[b]	0	10.176 (14.759)	300.4 (81.0)	295.1 (71.5)	73	-	-	-	-	23.6 (14.0)	090

*3/10 total sky cover at XMR and X68.

a. Altitudes of measurements are above natural grade, except where noted.

b. Approximately 1-min average prior to L+0.

c. Balloon release site.

d. Pad 39B thermodynamic measurements are taken at camera site No. 3, approximately 6.4 m (21 ft) above MSL.

e. Official STS-41 sky observational site.

Table 4. STS-41 prelaunch through launch KSC pad 39A atmospheric measurements.[a]

Hourly Atmospheric Measurements[a]						Sky Condition[b]			
6 October 1990 Time u.t.	Temperature (°F)	Dew Point (°F)	Relative Humidity (%)	60' Level (SE)		Clouds	Total Sky Cover	Vis. (mi.)	Other Remarks
				WS Kt	WD°				
0600	81	74	80	10	81	Scattered at 2,500 ft	2/10	10	
0700	81	74	80	10	83	Scattered at 2,500 ft	2/10	10	
0800	81	75	81	10	90	Scattered at 2,700 and 18,000 ft	4/10	10	
0900	81	74	78	11	100	Scattered at 2,600 and 5,000 ft	5/10	10	
1000	81	73	76	13	93	Scattered at 2,700 and 5,500 ft	5/10	10	
1100	81	72	75	14	95	Scattered at 3,000 and 7,000 ft	3/10	10	
L+0[c] 1147	81	72	73	14	90	Scattered at 3,000 and 7,000 ft	3/10	10	

a. Hourly pad observations (obtained via MSFC/HOSC) averaged over 5 min, centered on the hour.

b. Sky observations taken at the shuttle runway site X68.

c. L+0 PAD wind and thermodynamic parameters obtained from HOSC strip charts. The SE anemometer was used at the 60-ft level for L+0 wind conditions (approximately 1 min average prior to L+0).

Table 5. STS-41 ascent atmospheric data tape.

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
21.	23.60	90.00	27.20	0.1017E+04	0.1168E+04	21.90
100.	18.04	109.00	27.01	0.1014E+04	0.1166E+04	21.78
200.	19.36	108.00	26.76	0.1011E+04	0.1163E+04	21.63
300.	20.34	108.00	26.52	0.1007E+04	0.1160E+04	21.48
400.	21.65	107.00	26.27	0.1004E+04	0.1157E+04	21.32
500.	22.64	108.00	26.03	0.1000E+04	0.1154E+04	21.17
600.	31.17	102.00	25.79	0.9969E+03	0.1151E+04	21.02
700.	29.86	102.00	25.54	0.9935E+03	0.1148E+04	20.87
800.	26.90	101.00	25.30	0.9901E+03	0.1145E+04	20.71
900.	27.23	95.00	25.05	0.9867E+03	0.1142E+04	20.56
1000.	34.78	95.00	24.81	0.9833E+03	0.1139E+04	20.41
1100.	29.86	97.00	24.52	0.9799E+03	0.1136E+04	20.39
1200.	31.17	100.00	24.23	0.9765E+03	0.1133E+04	20.37
1300.	27.89	102.00	23.94	0.9731E+03	0.1130E+04	20.35
1400.	26.57	97.00	23.65	0.9698E+03	0.1128E+04	20.33
1500.	27.56	94.00	23.36	0.9664E+03	0.1125E+04	20.31
1600.	29.20	92.00	23.07	0.9631E+03	0.1122E+04	20.29
1700.	31.82	99.00	22.78	0.9597E+03	0.1119E+04	20.27
1800.	28.87	102.00	22.49	0.9564E+03	0.1116E+04	20.25
1900.	28.22	97.00	22.20	0.9531E+03	0.1114E+04	20.23
2000.	27.56	93.00	21.91	0.9498E+03	0.1111E+04	20.21
2100.	32.48	98.00	21.58	0.9465E+03	0.1108E+04	20.03
2200.	32.48	97.00	21.25	0.9431E+03	0.1106E+04	19.85
2300.	28.22	92.00	20.92	0.9398E+03	0.1103E+04	19.67
2400.	28.54	93.00	20.59	0.9365E+03	0.1101E+04	19.49
2500.	31.17	90.00	20.26	0.9333E+03	0.1098E+04	19.31
2600.	30.18	95.00	19.93	0.9300E+03	0.1095E+04	19.13
2700.	29.86	92.00	19.60	0.9267E+03	0.1093E+04	18.95
2800.	34.78	93.00	19.27	0.9235E+03	0.1090E+04	18.77
2900.	32.81	96.00	18.94	0.9202E+03	0.1088E+04	18.59
3000.	35.10	93.00	18.61	0.9170E+03	0.1085E+04	18.41
3100.	34.12	95.00	18.46	0.9138E+03	0.1082E+04	18.06
3200.	34.45	93.00	18.31	0.9105E+03	0.1079E+04	17.71
3300.	33.14	97.00	18.16	0.9073E+03	0.1076E+04	17.36
3400.	30.18	95.00	18.01	0.9041E+03	0.1073E+04	17.01
3500.	31.17	91.00	17.86	0.9009E+03	0.1070E+04	16.66
3600.	34.12	94.00	17.71	0.8977E+03	0.1067E+04	16.31
3700.	32.15	97.00	17.56	0.8946E+03	0.1064E+04	15.96
3800.	31.82	95.00	17.41	0.8914E+03	0.1061E+04	15.61
3900.	35.10	91.00	17.26	0.8882E+03	0.1058E+04	15.26
4000.	38.06	94.00	17.11	0.8851E+03	0.1055E+04	14.91
4100.	39.70	96.00	16.97	0.8820E+03	0.1051E+04	14.86
4200.	37.73	92.00	16.83	0.8788E+03	0.1048E+04	14.81
4300.	36.75	88.00	16.69	0.8757E+03	0.1045E+04	14.76
4400.	39.04	85.00	16.55	0.8726E+03	0.1042E+04	14.71
4500.	39.70	88.00	16.41	0.8695E+03	0.1038E+04	14.66
4600.	37.73	90.00	16.27	0.8664E+03	0.1035E+04	14.61
4700.	33.79	88.00	16.13	0.8634E+03	0.1032E+04	14.56
4800.	31.17	82.00	15.99	0.8603E+03	0.1029E+04	14.51
4900.	32.15	79.00	15.85	0.8572E+03	0.1026E+04	14.46

Table 5. STS-41 ascent atmospheric data tape (continued).

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
5000.	32.81	82.00	15.71	0.8542E+03	0.1023E+04	14.41
5100.	30.84	82.00	15.53	0.8511E+03	0.1020E+04	14.14
5200.	30.18	75.00	15.35	0.8481E+03	0.1017E+04	13.87
5300.	32.15	69.00	15.17	0.8451E+03	0.1014E+04	13.60
5400.	33.14	67.00	14.99	0.8420E+03	0.1011E+04	13.33
5500.	30.51	73.00	14.81	0.8390E+03	0.1008E+04	13.06
5600.	28.54	74.00	14.63	0.8360E+03	0.1005E+04	12.79
5700.	27.89	69.00	14.45	0.8330E+03	0.1002E+04	12.52
5800.	30.84	71.00	14.27	0.8300E+03	0.9995E+03	12.25
5900.	29.20	77.00	14.09	0.8271E+03	0.9966E+03	11.98
6000.	27.23	77.00	13.91	0.8241E+03	0.9938E+03	11.71
6100.	27.56	77.00	13.93	0.8211E+03	0.9907E+03	10.24
6200.	30.84	74.00	13.95	0.8182E+03	0.9876E+03	8.77
6300.	34.78	77.00	13.97	0.8153E+03	0.9845E+03	7.30
6400.	34.78	80.00	13.99	0.8123E+03	0.9813E+03	5.83
6500.	31.50	77.00	14.01	0.8094E+03	0.9781E+03	4.36
6600.	32.81	74.00	14.03	0.8065E+03	0.9749E+03	2.89
6700.	33.46	78.00	14.05	0.8036E+03	0.9717E+03	1.42
6800.	29.53	82.00	14.07	0.8007E+03	0.9684E+03	-0.05
6900.	24.93	81.00	14.09	0.7979E+03	0.9651E+03	-1.52
7000.	25.59	79.00	14.11	0.7950E+03	0.9619E+03	-2.99
7100.	27.23	79.00	14.06	0.7921E+03	0.9586E+03	-3.07
7200.	27.56	86.00	14.01	0.7893E+03	0.9553E+03	-3.15
7300.	25.26	95.00	13.96	0.7864E+03	0.9520E+03	-3.23
7400.	24.61	92.00	13.91	0.7836E+03	0.9488E+03	-3.31
7500.	26.25	88.00	13.86	0.7808E+03	0.9455E+03	-3.39
7600.	25.92	90.00	13.81	0.7780E+03	0.9423E+03	-3.47
7700.	21.98	94.00	13.76	0.7752E+03	0.9390E+03	-3.55
7800.	22.64	88.00	13.71	0.7724E+03	0.9358E+03	-3.63
7900.	27.23	84.00	13.66	0.7696E+03	0.9326E+03	-3.71
8000.	28.54	89.00	13.61	0.7668E+03	0.9294E+03	-3.79
8100.	25.26	89.00	13.42	0.7640E+03	0.9266E+03	-3.37
8200.	25.92	85.00	13.23	0.7613E+03	0.9238E+03	-2.95
8300.	26.57	88.00	13.04	0.7585E+03	0.9210E+03	-2.53
8400.	23.95	87.00	12.85	0.7558E+03	0.9182E+03	-2.11
8500.	23.95	79.00	12.66	0.7530E+03	0.9154E+03	-1.69
8600.	28.22	78.00	12.47	0.7503E+03	0.9126E+03	-1.27
8700.	28.87	81.00	12.28	0.7476E+03	0.9098E+03	-0.85
8800.	26.90	82.00	12.09	0.7449E+03	0.9070E+03	-0.43
8900.	28.22	79.00	11.90	0.7422E+03	0.9042E+03	-0.01
9000.	30.51	85.00	11.71	0.7395E+03	0.9015E+03	0.41
9100.	29.86	87.00	11.52	0.7368E+03	0.8987E+03	0.63
9200.	29.53	80.00	11.33	0.7341E+03	0.8960E+03	0.85
9300.	32.81	78.00	11.14	0.7314E+03	0.8932E+03	1.07
9400.	30.84	81.00	10.95	0.7288E+03	0.8905E+03	1.29
9500.	26.25	75.00	10.76	0.7261E+03	0.8878E+03	1.51
9600.	27.89	68.00	10.57	0.7235E+03	0.8851E+03	1.73
9700.	31.17	62.00	10.38	0.7208E+03	0.8824E+03	1.95
9800.	31.17	64.00	10.19	0.7182E+03	0.8797E+03	2.17
9900.	28.54	69.00	10.00	0.7156E+03	0.8770E+03	2.39

Table 5. STS-41 ascent atmospheric data tape (continued).

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
10000.	27.23	65.00	9.81	0.7130E+03	0.8744E+03	2.61
10100.	27.23	63.00	9.57	0.7104E+03	0.8719E+03	2.57
10200.	30.51	65.00	9.33	0.7078E+03	0.8694E+03	2.53
10300.	29.53	71.00	9.09	0.7052E+03	0.8670E+03	2.49
10400.	28.87	69.00	8.85	0.7026E+03	0.8646E+03	2.45
10500.	29.53	65.00	8.61	0.7000E+03	0.8621E+03	2.41
10600.	32.15	68.00	8.37	0.6975E+03	0.8597E+03	2.37
10700.	31.50	73.00	8.13	0.6949E+03	0.8573E+03	2.33
10800.	29.86	73.00	7.89	0.6924E+03	0.8548E+03	2.29
10900.	31.17	69.00	7.65	0.6898E+03	0.8524E+03	2.25
11000.	32.81	67.00	7.41	0.6873E+03	0.8500E+03	2.21
11100.	32.81	72.00	7.19	0.6848E+03	0.8476E+03	2.06
11200.	30.51	71.00	6.97	0.6822E+03	0.8452E+03	1.91
11300.	31.82	66.00	6.75	0.6797E+03	0.8427E+03	1.76
11400.	32.48	67.00	6.53	0.6772E+03	0.8403E+03	1.61
11500.	30.51	67.00	6.31	0.6747E+03	0.8379E+03	1.46
11600.	27.56	62.00	6.09	0.6722E+03	0.8355E+03	1.31
11700.	30.51	60.00	5.87	0.6698E+03	0.8331E+03	1.16
11800.	28.22	64.00	5.65	0.6673E+03	0.8307E+03	1.01
11900.	24.93	59.00	5.43	0.6648E+03	0.8283E+03	0.86
12000.	27.23	55.00	5.21	0.6624E+03	0.8259E+03	0.71
12100.	29.53	61.00	5.05	0.6599E+03	0.8233E+03	0.63
12200.	26.57	58.00	4.89	0.6575E+03	0.8207E+03	0.55
12300.	28.87	58.00	4.73	0.6550E+03	0.8182E+03	0.47
12400.	31.17	55.00	4.57	0.6526E+03	0.8156E+03	0.39
12500.	25.59	56.00	4.41	0.6501E+03	0.8130E+03	0.31
12600.	21.00	52.00	4.25	0.6477E+03	0.8105E+03	0.23
12700.	21.65	50.00	4.09	0.6453E+03	0.8079E+03	0.15
12800.	18.70	57.00	3.93	0.6429E+03	0.8054E+03	0.07
12900.	17.06	54.00	3.77	0.6405E+03	0.8028E+03	-0.01
13000.	19.69	45.00	3.61	0.6381E+03	0.8003E+03	-0.09
13100.	20.67	49.00	3.46	0.6357E+03	0.7978E+03	-0.39
13200.	18.37	47.00	3.31	0.6333E+03	0.7953E+03	-0.69
13300.	21.33	40.00	3.16	0.6310E+03	0.7928E+03	-0.99
13400.	21.00	45.00	3.01	0.6286E+03	0.7903E+03	-1.29
13500.	17.39	35.00	2.86	0.6263E+03	0.7879E+03	-1.59
13600.	20.34	28.00	2.71	0.6240E+03	0.7854E+03	-1.89
13700.	19.69	29.00	2.56	0.6216E+03	0.7830E+03	-2.19
13800.	14.76	15.00	2.41	0.6193E+03	0.7805E+03	-2.49
13900.	15.42	8.00	2.26	0.6170E+03	0.7781E+03	-2.79
14000.	14.44	13.00	2.11	0.6147E+03	0.7756E+03	-3.09
14100.	14.11	12.00	1.91	0.6124E+03	0.7733E+03	-3.26
14200.	16.40	10.00	1.71	0.6101E+03	0.7709E+03	-3.43
14300.	17.39	17.00	1.51	0.6078E+03	0.7686E+03	-3.60
14400.	15.09	21.00	1.31	0.6055E+03	0.7663E+03	-3.77
14500.	15.75	17.00	1.11	0.6032E+03	0.7640E+03	-3.94
14600.	15.09	20.00	0.91	0.6009E+03	0.7617E+03	-4.11
14700.	13.12	15.00	0.71	0.5986E+03	0.7594E+03	-4.28
14800.	15.42	13.00	0.51	0.5964E+03	0.7571E+03	-4.45
14900.	12.80	21.00	0.31	0.5941E+03	0.7548E+03	-4.62

Table 5. STS-41 ascent atmospheric data tape (continued).

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
15000.	13.78	22.00	0.11	0.5919E+03	0.7525E+03	-4.79
15100.	14.76	39.00	0.00	0.5897E+03	0.7500E+03	-5.13
15200.	16.08	46.00	-0.11	0.5874E+03	0.7475E+03	-5.47
15300.	14.44	43.00	-0.22	0.5852E+03	0.7450E+03	-5.81
15400.	16.08	49.00	-0.33	0.5830E+03	0.7426E+03	-6.15
15500.	15.42	50.00	-0.44	0.5808E+03	0.7401E+03	-6.49
15600.	17.39	43.00	-0.55	0.5786E+03	0.7376E+03	-6.83
15700.	16.73	49.00	-0.66	0.5764E+03	0.7352E+03	-7.17
15800.	16.73	40.00	-0.77	0.5742E+03	0.7327E+03	-7.51
15900.	19.69	46.00	-0.88	0.5721E+03	0.7303E+03	-7.85
16000.	16.08	41.00	-0.99	0.5699E+03	0.7279E+03	-8.19
16100.	18.70	42.00	-1.26	0.5677E+03	0.7258E+03	-8.33
16200.	18.04	45.00	-1.53	0.5656E+03	0.7238E+03	-8.47
16300.	16.73	42.00	-1.80	0.5634E+03	0.7218E+03	-8.61
16400.	17.72	40.00	-2.07	0.5612E+03	0.7197E+03	-8.75
16500.	15.09	43.00	-2.34	0.5591E+03	0.7177E+03	-8.89
16600.	17.39	33.00	-2.61	0.5570E+03	0.7157E+03	-9.03
16700.	16.73	42.00	-2.88	0.5548E+03	0.7137E+03	-9.17
16800.	14.76	30.00	-3.15	0.5527E+03	0.7117E+03	-9.31
16900.	18.70	29.00	-3.42	0.5506E+03	0.7097E+03	-9.45
17000.	17.39	30.00	-3.69	0.5485E+03	0.7077E+03	-9.59
17100.	19.03	27.00	-3.92	0.5464E+03	0.7055E+03	-9.50
17200.	17.39	31.00	-4.15	0.5443E+03	0.7034E+03	-9.41
17300.	16.40	23.00	-4.38	0.5422E+03	0.7013E+03	-9.32
17400.	16.40	28.00	-4.61	0.5401E+03	0.6991E+03	-9.23
17500.	13.12	39.00	-4.84	0.5380E+03	0.6970E+03	-9.14
17600.	10.17	45.00	-5.07	0.5359E+03	0.6949E+03	-9.05
17700.	12.14	57.00	-5.30	0.5339E+03	0.6928E+03	-8.96
17800.	10.83	66.00	-5.53	0.5318E+03	0.6907E+03	-8.87
17900.	10.50	53.00	-5.76	0.5297E+03	0.6886E+03	-8.78
18000.	12.14	65.00	-5.99	0.5277E+03	0.6865E+03	-8.69
18100.	12.14	61.00	-6.18	0.5257E+03	0.6844E+03	-8.73
18200.	12.47	51.00	-6.37	0.5236E+03	0.6822E+03	-8.77
18300.	9.19	55.00	-6.56	0.5216E+03	0.6800E+03	-8.81
18400.	11.15	37.00	-6.75	0.5196E+03	0.6779E+03	-8.85
18500.	11.15	36.00	-6.94	0.5176E+03	0.6757E+03	-8.89
18600.	9.51	22.00	-7.13	0.5155E+03	0.6736E+03	-8.93
18700.	12.80	26.00	-7.32	0.5135E+03	0.6715E+03	-8.97
18800.	10.17	20.00	-7.51	0.5116E+03	0.6693E+03	-9.01
18900.	9.51	10.00	-7.70	0.5096E+03	0.6672E+03	-9.05
19000.	11.81	15.00	-7.89	0.5076E+03	0.6651E+03	-9.09
19100.	7.55	9.00	-8.09	0.5056E+03	0.6631E+03	-9.63
19200.	7.87	348.00	-8.29	0.5036E+03	0.6610E+03	-10.17
19300.	9.19	344.00	-8.49	0.5017E+03	0.6590E+03	-10.71
19400.	5.91	347.00	-8.69	0.4997E+03	0.6570E+03	-11.25
19500.	5.25	320.00	-8.89	0.4978E+03	0.6549E+03	-11.79
19600.	9.19	327.00	-9.09	0.4958E+03	0.6529E+03	-12.33
19700.	10.17	327.00	-9.29	0.4939E+03	0.6509E+03	-12.87
19800.	11.48	316.00	-9.49	0.4919E+03	0.6489E+03	-13.41
19900.	14.44	319.00	-9.69	0.4900E+03	0.6469E+03	-13.95

Table 5. STS-41 ascent atmospheric data tape (continued).

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
20000.	14.44	317.00	-9.89	0.4881E+03	0.6449E+03	-14.49
20100.	14.44	311.00	-9.99	0.4862E+03	0.6426E+03	-14.82
20200.	17.72	307.00	-10.09	0.4843E+03	0.6404E+03	-15.15
20300.	16.73	307.00	-10.19	0.4824E+03	0.6381E+03	-15.48
20400.	18.37	295.00	-10.29	0.4805E+03	0.6358E+03	-15.81
20500.	22.64	294.00	-10.39	0.4786E+03	0.6336E+03	-16.14
20600.	21.00	291.00	-10.49	0.4767E+03	0.6314E+03	-16.47
20700.	19.69	283.00	-10.59	0.4748E+03	0.6291E+03	-16.80
20800.	21.00	286.00	-10.69	0.4729E+03	0.6269E+03	-17.13
20900.	18.37	292.00	-10.79	0.4711E+03	0.6247E+03	-17.46
21000.	18.70	285.00	-10.89	0.4692E+03	0.6225E+03	-17.79
21100.	19.03	285.00	-11.10	0.4673E+03	0.6205E+03	-18.08
21200.	18.37	292.00	-11.31	0.4655E+03	0.6186E+03	-18.37
21300.	16.08	288.00	-11.52	0.4637E+03	0.6167E+03	-18.66
21400.	17.06	290.00	-11.73	0.4618E+03	0.6147E+03	-18.95
21500.	15.09	290.00	-11.94	0.4600E+03	0.6128E+03	-19.24
21600.	14.44	283.00	-12.15	0.4582E+03	0.6109E+03	-19.53
21700.	18.04	282.00	-12.36	0.4564E+03	0.6090E+03	-19.82
21800.	18.04	287.00	-12.57	0.4546E+03	0.6071E+03	-20.11
21900.	15.75	292.00	-12.78	0.4528E+03	0.6052E+03	-20.40
22000.	18.04	298.00	-12.99	0.4510E+03	0.6033E+03	-20.69
22100.	14.11	309.00	-13.21	0.4492E+03	0.6015E+03	-21.64
22200.	12.47	301.00	-13.43	0.4474E+03	0.5996E+03	-22.59
22300.	14.44	311.00	-13.65	0.4456E+03	0.5978E+03	-23.54
22400.	12.47	326.00	-13.87	0.4438E+03	0.5959E+03	-24.49
22500.	14.11	317.00	-14.09	0.4421E+03	0.5941E+03	-25.44
22600.	16.08	325.00	-14.31	0.4403E+03	0.5922E+03	-26.39
22700.	15.42	333.00	-14.53	0.4385E+03	0.5904E+03	-27.34
22800.	14.76	334.00	-14.75	0.4368E+03	0.5886E+03	-28.29
22900.	16.73	338.00	-14.97	0.4350E+03	0.5867E+03	-29.24
23000.	13.78	339.00	-15.19	0.4333E+03	0.5849E+03	-30.19
23100.	14.11	329.00	-15.43	0.4316E+03	0.5831E+03	-30.51
23200.	13.78	336.00	-15.67	0.4298E+03	0.5813E+03	-30.83
23300.	12.14	328.00	-15.91	0.4281E+03	0.5795E+03	-31.15
23400.	14.11	332.00	-16.15	0.4264E+03	0.5777E+03	-31.47
23500.	13.78	339.00	-16.39	0.4247E+03	0.5760E+03	-31.79
23600.	14.11	333.00	-16.63	0.4230E+03	0.5742E+03	-32.11
23700.	15.09	332.00	-16.87	0.4213E+03	0.5724E+03	-32.43
23800.	16.73	349.00	-17.11	0.4196E+03	0.5707E+03	-32.75
23900.	16.40	340.00	-17.35	0.4179E+03	0.5689E+03	-33.07
24000.	18.37	345.00	-17.59	0.4162E+03	0.5672E+03	-33.39
24100.	18.70	353.00	-17.82	0.4145E+03	0.5654E+03	-33.62
24200.	18.37	346.00	-18.05	0.4128E+03	0.5636E+03	-33.85
24300.	19.36	348.00	-18.28	0.4111E+03	0.5618E+03	-34.08
24400.	18.37	353.00	-18.51	0.4094E+03	0.5600E+03	-34.31
24500.	18.70	354.00	-18.74	0.4078E+03	0.5582E+03	-34.54
24600.	23.62	357.00	-18.97	0.4061E+03	0.5564E+03	-34.77
24700.	21.33	355.00	-19.20	0.4044E+03	0.5546E+03	-35.00
24800.	23.95	348.00	-19.43	0.4028E+03	0.5529E+03	-35.23
24900.	23.62	346.00	-19.66	0.4011E+03	0.5511E+03	-35.46

Table 5. STS-41 ascent atmospheric data tape (continued).

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
25000.	20.34	343.00	-19.89	0.3995E+03	0.5494E+03	-35.69
25100.	20.67	330.00	-20.12	0.3979E+03	0.5476E+03	-35.85
25200.	20.34	334.00	-20.35	0.3962E+03	0.5459E+03	-36.01
25300.	19.36	326.00	-20.58	0.3946E+03	0.5441E+03	-36.17
25400.	21.65	319.00	-20.81	0.3930E+03	0.5424E+03	-36.33
25500.	22.97	328.00	-21.04	0.3914E+03	0.5407E+03	-36.49
25600.	21.65	329.00	-21.27	0.3898E+03	0.5389E+03	-36.65
25700.	23.62	327.00	-21.50	0.3882E+03	0.5372E+03	-36.81
25800.	25.59	328.00	-21.73	0.3866E+03	0.5355E+03	-36.97
25900.	22.64	323.00	-21.96	0.3850E+03	0.5338E+03	-37.13
26000.	23.29	325.00	-22.19	0.3834E+03	0.5321E+03	-37.29
26100.	24.61	325.00	-22.40	0.3818E+03	0.5303E+03	-37.42
26200.	22.31	321.00	-22.61	0.3802E+03	0.5286E+03	-37.55
26300.	23.95	315.00	-22.82	0.3787E+03	0.5269E+03	-37.68
26400.	24.61	317.00	-23.03	0.3771E+03	0.5251E+03	-37.81
26500.	24.61	316.00	-23.24	0.3756E+03	0.5234E+03	-37.94
26600.	26.57	312.00	-23.45	0.3740E+03	0.5217E+03	-38.07
26700.	26.25	313.00	-23.66	0.3725E+03	0.5200E+03	-38.20
26800.	26.57	314.00	-23.87	0.3709E+03	0.5183E+03	-38.33
26900.	27.23	306.00	-24.08	0.3694E+03	0.5166E+03	-38.46
27000.	28.87	308.00	-24.29	0.3679E+03	0.5149E+03	-38.59
27100.	28.87	306.00	-24.56	0.3664E+03	0.5133E+03	-38.61
27200.	31.17	304.00	-24.83	0.3648E+03	0.5117E+03	-38.63
27300.	33.14	305.00	-25.10	0.3633E+03	0.5101E+03	-38.65
27400.	31.82	300.00	-25.37	0.3618E+03	0.5085E+03	-38.67
27500.	37.73	303.00	-25.64	0.3603E+03	0.5070E+03	-38.69
27600.	37.73	299.00	-25.91	0.3588E+03	0.5054E+03	-38.71
27700.	38.71	301.00	-26.18	0.3573E+03	0.5038E+03	-38.73
27800.	37.07	303.00	-26.45	0.3558E+03	0.5023E+03	-38.75
27900.	38.71	300.00	-26.72	0.3543E+03	0.5007E+03	-38.77
28000.	37.40	302.00	-26.99	0.3528E+03	0.4992E+03	-38.79
28100.	36.75	305.00	-27.23	0.3513E+03	0.4976E+03	-39.00
28200.	38.06	308.00	-27.47	0.3498E+03	0.4959E+03	-39.21
28300.	37.07	309.00	-27.71	0.3484E+03	0.4943E+03	-39.42
28400.	40.35	308.00	-27.95	0.3469E+03	0.4927E+03	-39.63
28500.	39.04	308.00	-28.19	0.3454E+03	0.4911E+03	-39.84
28600.	38.71	307.00	-28.43	0.3440E+03	0.4895E+03	-40.05
28700.	39.04	310.00	-28.67	0.3425E+03	0.4880E+03	-40.26
28800.	38.71	309.00	-28.91	0.3411E+03	0.4864E+03	-40.47
28900.	41.67	309.00	-29.15	0.3396E+03	0.4848E+03	-40.68
29000.	40.68	310.00	-29.39	0.3382E+03	0.4832E+03	-40.89
29100.	41.01	305.00	-29.60	0.3368E+03	0.4816E+03	-41.16
29200.	41.67	304.00	-29.81	0.3353E+03	0.4799E+03	-41.43
29300.	40.35	302.00	-30.02	0.3339E+03	0.4783E+03	-41.70
29400.	40.03	305.00	-30.23	0.3324E+03	0.4767E+03	-41.97
29500.	37.73	307.00	-30.44	0.3310E+03	0.4750E+03	-42.24
29600.	39.04	309.00	-30.65	0.3296E+03	0.4734E+03	-42.51
29700.	38.39	310.00	-30.86	0.3282E+03	0.4718E+03	-42.78
29800.	37.73	309.00	-31.07	0.3268E+03	0.4702E+03	-43.05
29900.	38.71	312.00	-31.28	0.3254E+03	0.4686E+03	-43.32

Table 5. STS-41 ascent atmospheric data tape (continued).

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
30000.	41.34	312.00	-31.49	0.3240E+03	0.4670E+03	-43.59
30100.	40.35	316.00	-31.70	0.3226E+03	0.4654E+03	-43.81
30200.	41.34	314.00	-31.91	0.3212E+03	0.4638E+03	-44.03
30300.	43.31	317.00	-32.12	0.3199E+03	0.4622E+03	-44.25
30400.	41.34	315.00	-32.33	0.3185E+03	0.4607E+03	-44.47
30500.	41.99	313.00	-32.54	0.3171E+03	0.4591E+03	-44.69
30600.	41.01	313.00	-32.75	0.3158E+03	0.4575E+03	-44.91
30700.	42.98	311.00	-32.96	0.3144E+03	0.4560E+03	-45.13
30800.	43.96	315.00	-33.17	0.3131E+03	0.4544E+03	-45.35
30900.	42.98	313.00	-33.38	0.3117E+03	0.4529E+03	-45.57
31000.	42.98	314.00	-33.59	0.3104E+03	0.4513E+03	-45.79
31100.	43.31	314.00	-33.82	0.3091E+03	0.4498E+03	-45.93
31200.	44.62	313.00	-34.05	0.3077E+03	0.4483E+03	-46.07
31300.	43.64	313.00	-34.28	0.3064E+03	0.4468E+03	-46.21
31400.	42.98	310.00	-34.51	0.3051E+03	0.4453E+03	-46.35
31500.	46.59	311.00	-34.74	0.3037E+03	0.4438E+03	-46.49
31600.	47.24	308.00	-34.97	0.3024E+03	0.4423E+03	-46.63
31700.	49.87	307.00	-35.20	0.3011E+03	0.4408E+03	-46.77
31800.	50.85	308.00	-35.43	0.2998E+03	0.4393E+03	-46.91
31900.	52.49	305.00	-35.66	0.2985E+03	0.4378E+03	-47.05
32000.	55.12	306.00	-35.89	0.2972E+03	0.4363E+03	-47.19
32100.	53.81	304.00	-36.15	0.2959E+03	0.4349E+03	-47.44
32200.	58.40	303.00	-36.41	0.2946E+03	0.4335E+03	-47.69
32300.	56.76	300.00	-36.67	0.2933E+03	0.4320E+03	-47.94
32400.	60.04	299.00	-36.93	0.2920E+03	0.4306E+03	-48.19
32500.	61.35	298.00	-37.19	0.2907E+03	0.4292E+03	-48.44
32600.	58.73	296.00	-37.45	0.2895E+03	0.4278E+03	-48.69
32700.	62.66	295.00	-37.71	0.2882E+03	0.4264E+03	-48.94
32800.	60.70	295.00	-37.97	0.2869E+03	0.4250E+03	-49.19
32900.	59.71	293.00	-38.23	0.2857E+03	0.4236E+03	-49.44
33000.	62.01	294.00	-38.49	0.2844E+03	0.4222E+03	-49.69
33100.	62.01	296.00	-38.68	0.2831E+03	0.4207E+03	-49.87
33200.	63.32	296.00	-38.87	0.2819E+03	0.4191E+03	-50.06
33300.	62.99	297.00	-39.06	0.2807E+03	0.4176E+03	-50.23
33400.	60.70	297.00	-39.25	0.2794E+03	0.4161E+03	-50.41
33500.	63.32	297.00	-39.44	0.2782E+03	0.4146E+03	-50.59
33600.	63.65	298.00	-39.63	0.2770E+03	0.4131E+03	-50.77
33700.	65.29	295.00	-39.82	0.2757E+03	0.4116E+03	-50.95
33800.	68.57	294.00	-40.01	0.2745E+03	0.4102E+03	-51.13
33900.	66.93	292.00	-40.20	0.2733E+03	0.4087E+03	-51.31
34000.	71.19	290.00	-40.39	0.2721E+03	0.4072E+03	-51.49
34100.	71.19	291.00	-40.60	0.2709E+03	0.4058E+03	-51.67
34200.	71.19	291.00	-40.81	0.2697E+03	0.4043E+03	-51.85
34300.	70.87	291.00	-41.02	0.2685E+03	0.4029E+03	-52.03
34400.	70.21	292.00	-41.23	0.2673E+03	0.4014E+03	-52.21
34500.	70.54	292.00	-41.44	0.2661E+03	0.4000E+03	-52.39
34600.	70.54	293.00	-41.65	0.2649E+03	0.3986E+03	-52.57
34700.	66.27	293.00	-41.86	0.2637E+03	0.3972E+03	-52.75
34800.	69.55	294.00	-42.07	0.2625E+03	0.3958E+03	-52.93
34900.	69.23	295.00	-42.28	0.2614E+03	0.3944E+03	-53.11

Table 5. STS-41 ascent atmospheric data tape (continued).

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
35000.	68.24	295.00	-42.49	0.2602E+03	0.3930E+03	-53.29
35100.	68.57	296.00	-42.72	0.2590E+03	0.3916E+03	-53.48
35200.	67.91	298.00	-42.95	0.2579E+03	0.3902E+03	-53.67
35300.	71.52	297.00	-43.18	0.2567E+03	0.3888E+03	-53.86
35400.	72.51	299.00	-43.41	0.2555E+03	0.3875E+03	-54.05
35500.	74.15	298.00	-43.64	0.2544E+03	0.3861E+03	-54.24
35600.	76.44	297.00	-43.87	0.2532E+03	0.3847E+03	-54.43
35700.	76.44	299.00	-44.10	0.2521E+03	0.3834E+03	-54.62
35800.	79.72	296.00	-44.33	0.2510E+03	0.3821E+03	-54.81
35900.	81.04	295.00	-44.56	0.2498E+03	0.3807E+03	-55.00
36000.	78.41	296.00	-44.79	0.2487E+03	0.3794E+03	-55.19
36100.	77.43	296.00	-45.00	0.2476E+03	0.3780E+03	-55.38
36200.	76.77	295.00	-45.21	0.2464E+03	0.3766E+03	-55.57
36300.	79.40	295.00	-45.42	0.2453E+03	0.3753E+03	-55.76
36400.	79.72	296.00	-45.63	0.2442E+03	0.3739E+03	-55.95
36500.	80.05	295.00	-45.84	0.2431E+03	0.3725E+03	-56.14
36600.	79.72	295.00	-46.05	0.2420E+03	0.3712E+03	-56.33
36700.	75.79	296.00	-46.26	0.2409E+03	0.3698E+03	-56.52
36800.	80.05	296.00	-46.47	0.2398E+03	0.3685E+03	-56.71
36900.	78.74	297.00	-46.68	0.2387E+03	0.3671E+03	-56.90
37000.	81.04	298.00	-46.89	0.2376E+03	0.3658E+03	-57.09
37100.	77.43	298.00	-47.06	0.2365E+03	0.3644E+03	-57.25
37200.	81.36	298.00	-47.23	0.2354E+03	0.3630E+03	-57.41
37300.	80.05	298.00	-47.40	0.2344E+03	0.3617E+03	-57.57
37400.	82.68	297.00	-47.57	0.2333E+03	0.3603E+03	-57.73
37500.	79.72	297.00	-47.74	0.2322E+03	0.3589E+03	-57.89
37600.	79.40	298.00	-47.91	0.2312E+03	0.3575E+03	-58.05
37700.	81.04	298.00	-48.08	0.2301E+03	0.3562E+03	-58.21
37800.	84.97	299.00	-48.25	0.2291E+03	0.3548E+03	-58.37
37900.	83.33	300.00	-48.42	0.2280E+03	0.3535E+03	-58.53
38000.	85.96	300.00	-48.59	0.2270E+03	0.3521E+03	-58.69
38100.	84.97	301.00	-48.77	0.2259E+03	0.3508E+03	-58.85
38200.	84.97	300.00	-48.95	0.2249E+03	0.3494E+03	-59.01
38300.	84.65	301.00	-49.13	0.2239E+03	0.3481E+03	-59.17
38400.	83.66	300.00	-49.31	0.2228E+03	0.3468E+03	-59.33
38500.	84.32	301.00	-49.49	0.2218E+03	0.3454E+03	-59.49
38600.	82.35	303.00	-49.67	0.2208E+03	0.3441E+03	-59.65
38700.	81.36	302.00	-49.85	0.2197E+03	0.3428E+03	-59.81
38800.	84.65	301.00	-50.03	0.2187E+03	0.3415E+03	-59.97
38900.	83.99	300.00	-50.21	0.2177E+03	0.3402E+03	-60.13
39000.	84.32	301.00	-50.39	0.2167E+03	0.3389E+03	-60.29
39100.	82.02	301.00	-50.65	0.2157E+03	0.3377E+03	-60.51
39200.	83.01	299.00	-50.91	0.2147E+03	0.3365E+03	-60.73
39300.	83.01	299.00	-51.17	0.2137E+03	0.3353E+03	-60.95
39400.	82.68	298.00	-51.43	0.2127E+03	0.3342E+03	-61.17
39500.	84.32	297.00	-51.69	0.2117E+03	0.3330E+03	-61.39
39600.	82.35	298.00	-51.95	0.2107E+03	0.3318E+03	-61.61
39700.	82.02	299.00	-52.21	0.2097E+03	0.3307E+03	-61.83
39800.	81.69	300.00	-52.47	0.2087E+03	0.3295E+03	-62.05
39900.	84.32	298.00	-52.73	0.2078E+03	0.3284E+03	-62.27

Table 5. STS-41 ascent atmospheric data tape (continued).

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
40000.	82.35	298.00	-52.99	0.2068E+03	0.3272E+03	-62.49
40100.	80.71	297.00	-53.26	0.2058E+03	0.3261E+03	-62.72
40200.	82.35	297.00	-53.53	0.2048E+03	0.3249E+03	-62.95
40300.	81.69	297.00	-53.80	0.2039E+03	0.3238E+03	-63.18
40400.	81.36	297.00	-54.07	0.2029E+03	0.3226E+03	-63.41
40500.	80.71	299.00	-54.34	0.2019E+03	0.3215E+03	-63.64
40600.	81.04	297.00	-54.61	0.2010E+03	0.3204E+03	-63.87
40700.	83.66	295.00	-54.88	0.2000E+03	0.3193E+03	-64.10
40800.	83.01	295.00	-55.15	0.1991E+03	0.3181E+03	-64.33
40900.	84.65	295.00	-55.42	0.1981E+03	0.3170E+03	-64.56
41000.	83.33	296.00	-55.69	0.1972E+03	0.3159E+03	-64.79
41100.	82.68	296.00	-55.92	0.1963E+03	0.3147E+03	-65.00
41200.	82.35	295.00	-56.15	0.1953E+03	0.3136E+03	-65.21
41300.	85.29	293.00	-56.38	0.1944E+03	0.3124E+03	-65.42
41400.	81.69	297.00	-56.61	0.1935E+03	0.3112E+03	-65.63
41500.	82.68	296.00	-56.84	0.1925E+03	0.3101E+03	-65.84
41600.	83.99	295.00	-57.07	0.1916E+03	0.3089E+03	-66.05
41700.	80.05	297.00	-57.30	0.1907E+03	0.3078E+03	-66.26
41800.	81.04	296.00	-57.53	0.1898E+03	0.3067E+03	-66.47
41900.	81.04	296.00	-57.76	0.1889E+03	0.3055E+03	-66.68
42000.	79.07	297.00	-57.99	0.1880E+03	0.3044E+03	-66.89
42100.	80.05	294.00	-58.24	0.1871E+03	0.3033E+03	-9999.00
42200.	82.35	294.00	-58.49	0.1862E+03	0.3022E+03	-9999.00
42300.	79.40	291.00	-58.74	0.1853E+03	0.3010E+03	-9999.00
42400.	78.41	294.00	-58.99	0.1844E+03	0.2999E+03	-9999.00
42500.	80.05	295.00	-59.24	0.1835E+03	0.2988E+03	-9999.00
42600.	77.76	296.00	-59.49	0.1826E+03	0.2977E+03	-9999.00
42700.	79.07	296.00	-59.74	0.1817E+03	0.2966E+03	-9999.00
42800.	77.43	297.00	-59.99	0.1808E+03	0.2956E+03	-9999.00
42900.	80.05	296.00	-60.24	0.1800E+03	0.2945E+03	-9999.00
43000.	83.33	297.00	-60.49	0.1791E+03	0.2934E+03	-9999.00
43100.	81.04	295.00	-60.68	0.1782E+03	0.2922E+03	-9999.00
43200.	81.04	296.00	-60.87	0.1774E+03	0.2911E+03	-9999.00
43300.	83.01	296.00	-61.06	0.1765E+03	0.2899E+03	-9999.00
43400.	81.69	296.00	-61.25	0.1757E+03	0.2888E+03	-9999.00
43500.	82.35	295.00	-61.44	0.1748E+03	0.2876E+03	-9999.00
43600.	82.68	299.00	-61.63	0.1740E+03	0.2865E+03	-9999.00
43700.	81.36	296.00	-61.82	0.1731E+03	0.2854E+03	-9999.00
43800.	82.35	295.00	-62.01	0.1723E+03	0.2842E+03	-9999.00
43900.	84.32	293.00	-62.20	0.1714E+03	0.2831E+03	-9999.00
44000.	80.71	293.00	-62.39	0.1706E+03	0.2820E+03	-9999.00
44100.	81.69	293.00	-62.55	0.1698E+03	0.2808E+03	-9999.00
44200.	81.36	293.00	-62.71	0.1689E+03	0.2796E+03	-9999.00
44300.	82.68	292.00	-62.87	0.1681E+03	0.2785E+03	-9999.00
44400.	80.71	294.00	-63.03	0.1673E+03	0.2773E+03	-9999.00
44500.	79.72	293.00	-63.19	0.1664E+03	0.2762E+03	-9999.00
44600.	80.05	295.00	-63.35	0.1656E+03	0.2750E+03	-9999.00
44700.	79.07	294.00	-63.51	0.1648E+03	0.2739E+03	-9999.00
44800.	82.02	293.00	-63.67	0.1640E+03	0.2727E+03	-9999.00
44900.	80.05	293.00	-63.83	0.1632E+03	0.2716E+03	-9999.00

Table 5. STS-41 ascent atmospheric data tape (continued).

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
45000.	78.74	294.00	-63.99	0.1624E+03	0.2705E+03	-9999.00
45100.	80.38	294.00	-64.25	0.1616E+03	0.2695E+03	-9999.00
45200.	78.41	293.00	-64.51	0.1608E+03	0.2685E+03	-9999.00
45300.	80.05	290.00	-64.77	0.1600E+03	0.2675E+03	-9999.00
45400.	77.10	291.00	-65.03	0.1592E+03	0.2665E+03	-9999.00
45500.	73.82	290.00	-65.29	0.1584E+03	0.2655E+03	-9999.00
45600.	76.44	291.00	-65.55	0.1576E+03	0.2645E+03	-9999.00
45700.	74.15	292.00	-65.81	0.1568E+03	0.2635E+03	-9999.00
45800.	78.41	290.00	-66.07	0.1560E+03	0.2625E+03	-9999.00
45900.	75.46	290.00	-66.33	0.1553E+03	0.2615E+03	-9999.00
46000.	73.49	287.00	-66.59	0.1545E+03	0.2606E+03	-9999.00
46100.	74.80	285.00	-66.77	0.1537E+03	0.2595E+03	-9999.00
46200.	73.82	285.00	-66.95	0.1529E+03	0.2584E+03	-9999.00
46300.	73.82	282.00	-67.13	0.1522E+03	0.2573E+03	-9999.00
46400.	73.49	281.00	-67.31	0.1514E+03	0.2563E+03	-9999.00
46500.	75.46	283.00	-67.49	0.1507E+03	0.2552E+03	-9999.00
46600.	74.80	283.00	-67.67	0.1499E+03	0.2541E+03	-9999.00
46700.	75.79	281.00	-67.85	0.1491E+03	0.2531E+03	-9999.00
46800.	71.85	284.00	-68.03	0.1484E+03	0.2520E+03	-9999.00
46900.	70.87	286.00	-68.21	0.1476E+03	0.2510E+03	-9999.00
47000.	69.88	286.00	-68.39	0.1469E+03	0.2499E+03	-9999.00
47100.	76.44	282.00	-68.55	0.1462E+03	0.2489E+03	-9999.00
47200.	69.88	288.00	-68.71	0.1454E+03	0.2478E+03	-9999.00
47300.	73.16	285.00	-68.87	0.1447E+03	0.2468E+03	-9999.00
47400.	77.10	284.00	-69.03	0.1440E+03	0.2457E+03	-9999.00
47500.	75.13	287.00	-69.19	0.1433E+03	0.2447E+03	-9999.00
47600.	77.10	284.00	-69.35	0.1425E+03	0.2436E+03	-9999.00
47700.	73.49	287.00	-69.51	0.1418E+03	0.2426E+03	-9999.00
47800.	74.48	288.00	-69.67	0.1411E+03	0.2416E+03	-9999.00
47900.	71.85	285.00	-69.83	0.1404E+03	0.2406E+03	-9999.00
48000.	77.43	284.00	-69.99	0.1397E+03	0.2396E+03	-9999.00
48100.	75.79	286.00	-70.09	0.1390E+03	0.2384E+03	-9999.00
48200.	74.48	290.00	-70.19	0.1383E+03	0.2373E+03	-9999.00
48300.	77.43	288.00	-70.29	0.1376E+03	0.2362E+03	-9999.00
48400.	80.05	290.00	-70.39	0.1369E+03	0.2351E+03	-9999.00
48500.	77.43	290.00	-70.49	0.1362E+03	0.2340E+03	-9999.00
48600.	79.40	288.00	-70.59	0.1355E+03	0.2330E+03	-9999.00
48700.	78.41	293.00	-70.69	0.1348E+03	0.2319E+03	-9999.00
48800.	78.08	294.00	-70.79	0.1341E+03	0.2308E+03	-9999.00
48900.	80.71	293.00	-70.89	0.1334E+03	0.2297E+03	-9999.00
49000.	74.80	296.00	-70.99	0.1327E+03	0.2287E+03	-9999.00
49100.	70.87	296.00	-71.00	0.1320E+03	0.2275E+03	-9999.00
49200.	65.62	296.00	-71.01	0.1314E+03	0.2264E+03	-9999.00
49300.	70.87	289.00	-71.02	0.1307E+03	0.2252E+03	-9999.00
49400.	70.54	289.00	-71.03	0.1300E+03	0.2241E+03	-9999.00
49500.	68.24	289.00	-71.04	0.1294E+03	0.2230E+03	-9999.00
49600.	66.27	288.00	-71.05	0.1287E+03	0.2218E+03	-9999.00
49700.	66.93	285.00	-71.06	0.1280E+03	0.2207E+03	-9999.00
49800.	61.68	289.00	-71.07	0.1274E+03	0.2196E+03	-9999.00
49900.	66.27	284.00	-71.08	0.1267E+03	0.2185E+03	-9999.00

Table 5. STS-41 ascent atmospheric data tape (continued).

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
50000.	63.65	290.00	-71.09	0.1261E+03	0.2174E+03	-9999.00
50100.	68.57	282.00	-71.26	0.1255E+03	0.2165E+03	-9999.00
50200.	63.98	292.00	-71.43	0.1248E+03	0.2156E+03	-9999.00
50300.	66.93	287.00	-71.60	0.1242E+03	0.2146E+03	-9999.00
50400.	65.62	287.00	-71.77	0.1235E+03	0.2137E+03	-9999.00
50500.	68.57	284.00	-71.94	0.1229E+03	0.2128E+03	-9999.00
50600.	60.70	282.00	-72.11	0.1223E+03	0.2119E+03	-9999.00
50700.	64.96	283.00	-72.28	0.1217E+03	0.2110E+03	-9999.00
50800.	61.68	284.00	-72.45	0.1210E+03	0.2101E+03	-9999.00
50900.	65.94	280.00	-72.62	0.1204E+03	0.2092E+03	-9999.00
51000.	63.98	284.00	-72.79	0.1198E+03	0.2083E+03	-9999.00
51100.	64.30	286.00	-72.97	0.1192E+03	0.2074E+03	-9999.00
51200.	65.29	285.00	-73.15	0.1186E+03	0.2065E+03	-9999.00
51300.	64.96	289.00	-73.33	0.1179E+03	0.2056E+03	-9999.00
51400.	64.96	294.00	-73.51	0.1173E+03	0.2047E+03	-9999.00
51500.	64.96	296.00	-73.69	0.1167E+03	0.2038E+03	-9999.00
51600.	68.24	291.00	-73.87	0.1161E+03	0.2030E+03	-9999.00
51700.	62.99	296.00	-74.05	0.1155E+03	0.2021E+03	-9999.00
51800.	62.01	298.00	-74.23	0.1149E+03	0.2012E+03	-9999.00
51900.	60.70	304.00	-74.41	0.1143E+03	0.2003E+03	-9999.00
52000.	62.66	304.00	-74.59	0.1137E+03	0.1995E+03	-9999.00
52100.	62.34	306.00	-74.75	0.1131E+03	0.1986E+03	-9999.00
52200.	56.76	309.00	-74.91	0.1125E+03	0.1977E+03	-9999.00
52300.	48.88	312.00	-75.07	0.1119E+03	0.1969E+03	-9999.00
52400.	44.29	304.00	-75.23	0.1113E+03	0.1960E+03	-9999.00
52500.	41.67	304.00	-75.39	0.1108E+03	0.1951E+03	-9999.00
52600.	37.07	296.00	-75.55	0.1102E+03	0.1943E+03	-9999.00
52700.	35.10	299.00	-75.71	0.1096E+03	0.1934E+03	-9999.00
52800.	34.78	296.00	-75.87	0.1090E+03	0.1925E+03	-9999.00
52900.	32.15	294.00	-76.03	0.1085E+03	0.1917E+03	-9999.00
53000.	31.17	288.00	-76.19	0.1079E+03	0.1908E+03	-9999.00
54000.	37.40	291.00	-76.49	0.1024E+03	0.1814E+03	-9999.00
55000.	40.36	302.00	-76.09	0.9716E+02	0.1718E+03	-9999.00
56000.	42.98	319.00	-75.69	0.9220E+02	0.1627E+03	-9999.00
57000.	33.46	331.00	-74.99	0.8751E+02	0.1538E+03	-9999.00
58000.	19.36	320.00	-72.79	0.8308E+02	0.1445E+03	-9999.00
59000.	17.39	321.00	-69.19	0.7894E+02	0.1348E+03	-9999.00
60000.	23.62	11.00	-65.89	0.7507E+02	0.1262E+03	-9999.00
61000.	26.57	46.00	-65.19	0.7143E+02	0.1197E+03	-9999.00
62000.	21.65	77.00	-64.69	0.6797E+02	0.1136E+03	-9999.00
63000.	17.06	86.00	-65.19	0.6468E+02	0.1083E+03	-9999.00
64000.	17.39	77.00	-64.29	0.6155E+02	0.1027E+03	-9999.00
65000.	21.65	69.00	-62.59	0.5860E+02	0.9695E+02	-9999.00
66000.	24.61	68.00	-63.39	0.5579E+02	0.9266E+02	-9999.00
67000.	24.61	73.00	-63.69	0.5310E+02	0.8831E+02	-9999.00
68000.	22.97	75.00	-62.39	0.5056E+02	0.8357E+02	-9999.00
69000.	19.36	74.00	-60.69	0.4815E+02	0.7895E+02	-9999.00
70000.	15.09	68.00	-57.79	0.4588E+02	0.7422E+02	-9999.00
71000.	15.09	59.00	-56.99	0.4374E+02	0.7049E+02	-9999.00
72000.	20.67	66.00	-56.19	0.4170E+02	0.6696E+02	-9999.00

Table 5. STS-41 ascent atmospheric data tape (continued).

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
73000.	25.92	75.00	56.09	0.3977E+02	0.6383E+02	-9999.00
74000.	28.22	71.00	57.29	0.3792E+02	0.6120E+02	-9999.00
75000.	31.17	62.00	56.89	0.3615E+02	0.5823E+02	-9999.00
76000.	31.82	62.00	-54.59	0.3447E+02	0.5494E+02	-9999.00
77000.	32.15	65.00	-54.79	0.3289E+02	0.5247E+02	-9999.00
78000.	33.14	74.00	54.59	0.3137E+02	0.5000E+02	-9999.00
79000.	31.82	81.00	53.89	0.2992E+02	0.4754E+02	-9999.00
80000.	29.86	87.00	53.49	0.2855E+02	0.4528E+02	-9999.00
81000.	27.56	89.00	-52.69	0.2724E+02	0.4304E+02	-9999.00
82000.	26.25	90.00	-52.09	0.2600E+02	0.4097E+02	9999.00
83000.	20.34	87.00	-52.19	0.2482E+02	0.3913E+02	-9999.00
84000.	15.09	73.00	-51.09	0.2369E+02	0.3716E+02	-9999.00
85000.	15.42	45.00	-49.29	0.2262E+02	0.3520E+02	-9999.00
86000.	17.72	16.00	-48.49	0.2160E+02	0.3349E+02	-9999.00
87000.	19.03	10.00	-48.89	0.2063E+02	0.3205E+02	-9999.00
88000.	17.39	57.00	-48.19	0.1971E+02	0.3052E+02	-9999.00
89000.	15.75	80.00	47.09	0.1883E+02	0.2902E+02	-9999.00
90000.	14.11	87.00	-47.09	0.1799E+02	0.2772E+02	-9999.00
91000.	14.76	73.00	-46.59	0.1719E+02	0.2643E+02	-9999.00
92000.	16.73	68.00	-45.69	0.1643E+02	0.2516E+02	-9999.00
93000.	15.42	76.00	-45.09	0.1570E+02	0.2398E+02	-9999.00
94000.	13.12	77.00	-41.39	0.1501E+02	0.2286E+02	-9999.00
95000.	13.78	64.00	-44.19	0.1435E+02	0.2183E+02	-9999.00
96000.	16.08	52.00	44.09	0.1371E+02	0.2085E+02	-9999.00
97000.	18.04	38.00	44.89	0.1311E+02	0.2001E+02	-9999.00
98000.	20.34	20.00	45.69	0.1253E+02	0.1919E+02	-9999.00
99000.	22.31	14.00	41.69	0.1198E+02	0.1827E+02	-9999.00
100000.	21.95	48.00	42.81	0.1099E+02	0.1662E+02	-9999.00
101000.	18.57	41.00	-50.15	0.1050E+02	0.1640E+02	-9999.00
102000.	28.67	358.00	40.68	0.1007E+02	0.1501E+02	-9999.00
103000.	28.67	355.00	48.93	0.9594E+01	0.1491E+02	-9999.00
104000.	27.00	25.00	-47.68	0.9161E+01	0.1415E+02	-9999.00
105000.	27.00	57.00	-44.12	0.8759E+01	0.1332E+02	9999.00
106000.	27.00	66.00	-42.15	0.8376E+01	0.1263E+02	-9999.00
107000.	5.05	114.00	-39.98	0.8021E+01	0.1198E+02	-9999.00
108000.	18.57	359.00	-50.09	0.7664E+01	0.1197E+02	-9999.00
109000.	11.81	15.00	-36.34	0.7330E+01	0.1078E+02	-9999.00
110000.	25.33	198.00	-41.91	0.7016E+01	0.1057E+02	-9999.00
111000.	32.05	218.00	39.13	0.6715E+01	0.1001E+02	-9999.00
112000.	25.33	231.00	41.08	0.6426E+01	0.9646E+01	-9999.00
113000.	33.76	246.00	44.51	0.6147E+01	0.9366E+01	-9999.00
114000.	21.95	241.00	-46.51	0.5875E+01	0.9030E+01	-9999.00
115000.	33.76	253.00	52.18	0.5609E+01	0.8843E+01	-9999.00
116000.	40.52	252.00	36.81	0.5360E+01	0.7901E+01	-9999.00
117000.	54.00	249.00	39.08	0.5134E+01	0.7641E+01	-9999.00
118000.	40.52	274.00	49.41	0.4907E+01	0.7640E+01	-9999.00
119000.	28.67	276.00	46.51	0.4689E+01	0.7207E+01	-9999.00
120000.	30.38	238.00	40.79	0.4485E+01	0.6724E+01	9999.00
121000.	33.76	233.00	35.15	0.4293E+01	0.6284E+01	-9999.00
122000.	42.19	259.00	-36.30	0.4111E+01	0.6047E+01	-9999.00

Table 5. STS-41 ascent atmospheric data tape (continued).

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
123000.	57.38	269.00	-34.49	0.3938E+01	0.5748E+01	-9999.00
124000.	52.33	275.00	-32.15	0.3774E+01	0.5455E+01	-9999.00
125000.	57.38	294.00	-31.11	0.3616E+01	0.5205E+01	-9999.00
126000.	67.52	304.00	-23.19	0.3470E+01	0.4836E+01	-9999.00
127000.	59.06	304.00	-29.98	0.3329E+01	0.4769E+01	-9999.00
128000.	50.62	286.00	-34.62	0.3190E+01	0.4659E+01	-9999.00
129000.	48.95	276.00	-31.74	0.3057E+01	0.4411E+01	-9999.00
130000.	50.62	284.00	-26.01	0.2933E+01	0.4134E+01	-9999.00
131000.	50.62	303.00	-33.02	0.2812E+01	0.4080E+01	-9999.00
132000.	50.62	305.00	-28.40	0.2695E+01	0.3836E+01	-9999.00
133000.	52.33	293.00	-14.75	0.2588E+01	0.3489E+01	-9999.00
134000.	50.62	282.00	-13.83	0.2488E+01	0.3342E+01	-9999.00
135000.	45.57	278.00	-17.77	0.2390E+01	0.3260E+01	-9999.00
136000.	35.43	278.00	-11.36	0.2298E+01	0.3058E+01	-9999.00
137000.	23.62	289.00	-9.38	0.2210E+01	0.2919E+01	-9999.00
138000.	20.24	284.00	-11.15	0.2126E+01	0.2827E+01	-9999.00
139000.	25.33	249.00	-11.87	0.2044E+01	0.2725E+01	-9999.00
140000.	37.14	242.00	-16.35	0.1965E+01	0.2666E+01	-9999.00
141000.	43.86	251.00	-16.38	0.1888E+01	0.2562E+01	-9999.00
142000.	42.19	255.00	-10.75	0.1815E+01	0.2410E+01	-9999.00
143000.	35.43	266.00	-16.59	0.1745E+01	0.2369E+01	-9999.00
144000.	38.81	273.00	-16.15	0.1677E+01	0.2273E+01	-9999.00
145000.	47.24	269.00	-15.11	0.1612E+01	0.2176E+01	-9999.00
146000.	54.00	263.00	-25.17	0.1548E+01	0.2175E+01	-9999.00
147000.	55.71	260.00	-22.09	0.1486E+01	0.2062E+01	-9999.00
148000.	59.06	258.00	-20.15	0.1427E+01	0.1965E+01	-9999.00
149000.	60.76	259.00	-15.15	0.1371E+01	0.1851E+01	-9999.00
150000.	67.52	263.00	-11.51	0.1318E+01	0.1755E+01	-9999.00
151000.	75.95	264.00	-9.72	0.1268E+01	0.1677E+01	-9999.00
152000.	87.76	258.00	-10.57	0.1220E+01	0.1619E+01	-9999.00
153000.	97.90	253.00	-9.15	0.1173E+01	0.1548E+01	-9999.00
154000.	101.25	252.00	-9.15	0.1128E+01	0.1488E+01	-9999.00
155000.	96.19	254.00	-9.96	0.1086E+01	0.1437E+01	-9999.00
156000.	92.81	257.00	-8.98	0.1044E+01	0.1377E+01	-9999.00
157000.	94.52	260.00	-5.20	0.1005E+01	0.1307E+01	-9999.00
158000.	99.57	260.00	-1.53	0.9677E+00	0.1241E+01	-9999.00
159000.	102.95	259.00	-0.61	0.9320E+00	0.1191E+01	-9999.00
160000.	104.63	257.00	-4.51	0.8974E+00	0.1164E+01	-9999.00
161000.	104.63	257.00	-2.15	0.8641E+00	0.1111E+01	-9999.00
162000.	106.33	259.00	-1.97	0.8322E+00	0.1069E+01	-9999.00
163000.	111.38	263.00	-0.54	0.8016E+00	0.1024E+01	-9999.00
164000.	118.14	267.00	-1.28	0.7721E+00	0.9894E+00	-9999.00
165000.	123.20	270.00	0.31	0.7437E+00	0.9474E+00	-9999.00
166000.	126.57	274.00	3.78	0.7166E+00	0.9015E+00	-9999.00
167000.	124.90	277.00	6.17	0.6907E+00	0.8614E+00	-9999.00
168000.	121.52	279.00	4.69	0.6660E+00	0.8351E+00	-9999.00
169000.	118.14	282.00	0.85	0.6418E+00	0.8160E+00	-9999.00
170000.	114.76	284.00	4.07	0.6184E+00	0.7771E+00	-9999.00
171000.	111.38	287.00	6.63	0.5962E+00	0.7424E+00	-9999.00
172000.	108.01	287.00	0.21	0.5746E+00	0.7323E+00	-9999.00

Table 5. STS-41 ascent atmospheric data tape (continued).

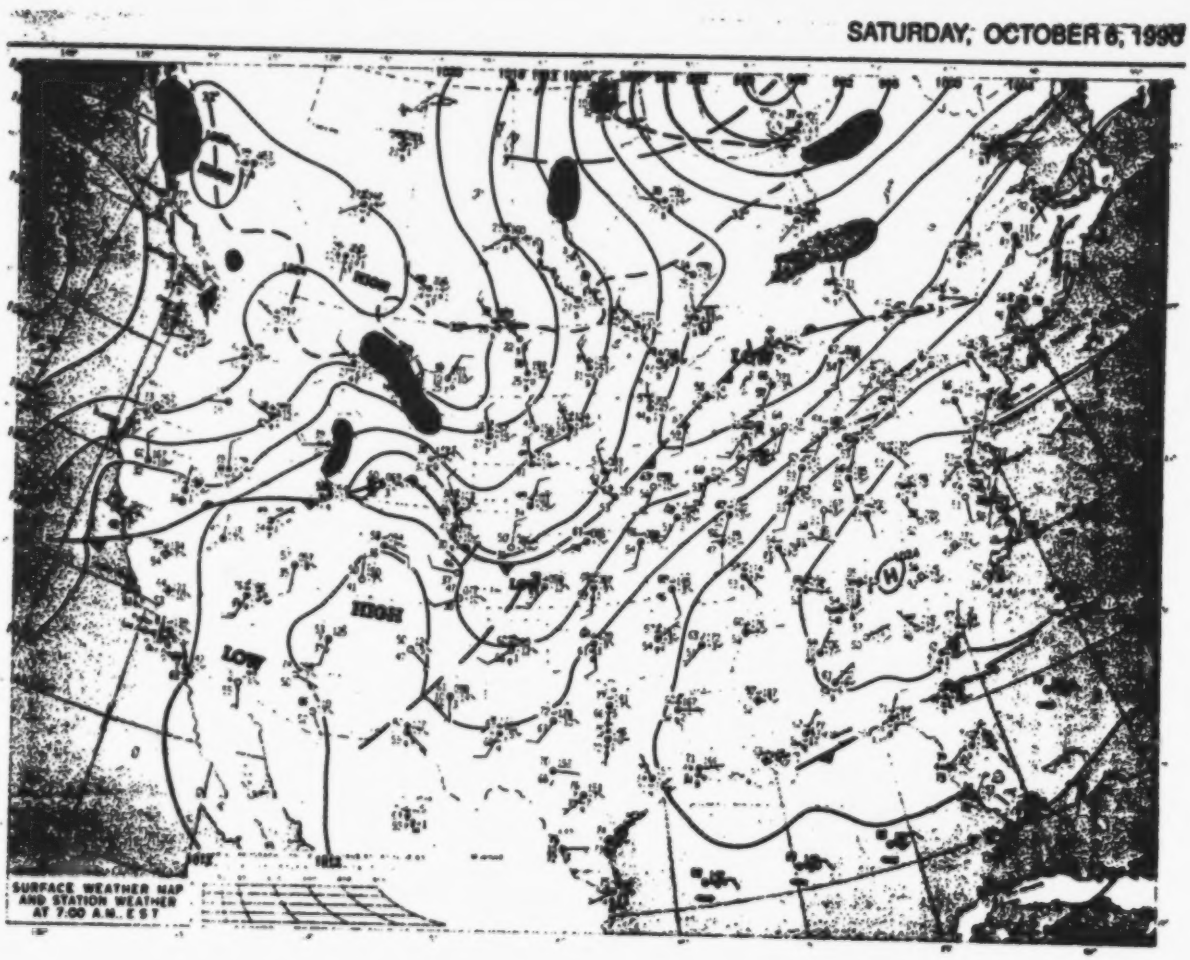
ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
173000.	102.95	286.00	-5.78	0.5533E+00	0.7209E+00	-9999.00
174000.	96.19	281.00	-5.97	0.5326E+00	0.6944E+00	-9999.00
175000.	91.14	273.00	-5.63	0.5127E+00	0.6676E+00	-9999.00
176000.	92.81	266.00	-9.37	0.4934E+00	0.6516E+00	-9999.00
177000.	96.19	260.00	-11.15	0.4746E+00	0.6311E+00	-9999.00
178000.	101.25	255.00	-11.15	0.4565E+00	0.6070E+00	-9999.00
179000.	106.33	251.00	-8.35	0.4392E+00	0.5778E+00	-9999.00
180000.	111.38	249.00	-5.15	0.4228E+00	0.5496E+00	-9999.00
181000.	113.06	249.00	-8.31	0.4070E+00	0.5354E+00	-9999.00
182000.	116.44	251.00	-14.54	0.3914E+00	0.5272E+00	-9999.00
183000.	118.14	252.00	-16.93	0.3763E+00	0.5116E+00	-9999.00
184000.	119.82	254.00	-17.92	0.3615E+00	0.4934E+00	-9999.00
185000.	123.20	256.00	-12.39	0.3475E+00	0.4643E+00	-9999.00
186000.	128.25	257.00	-11.15	0.3342E+00	0.4444E+00	-9999.00
187000.	131.63	258.00	-7.20	0.3216E+00	0.4213E+00	-9999.00
188000.	131.63	259.00	-10.77	0.3094E+00	0.4108E+00	-9999.00
189000.	131.63	261.00	-18.29	0.2975E+00	0.4067E+00	-9999.00
190000.	131.63	263.00	-23.30	0.2857E+00	0.3984E+00	-9999.00
191000.	129.95	266.00	-30.15	0.2742E+00	0.3931E+00	-9999.00
192000.	126.57	268.00	-28.93	0.2630E+00	0.3752E+00	-9999.00
193000.	124.90	270.00	-26.45	0.2523E+00	0.3563E+00	-9999.00
194000.	123.20	272.00	-26.81	0.2421E+00	0.3424E+00	-9999.00
195000.	123.20	273.00	-29.33	0.2323E+00	0.3319E+00	-9999.00
196000.	123.20	274.00	-30.85	0.2228E+00	0.3203E+00	-9999.00
197000.	123.20	275.00	-33.15	0.2143E+00	0.3111E+00	-9999.00
198000.	126.57	275.00	-34.63	0.2059E+00	0.3007E+00	-9999.00
199000.	129.95	275.00	-36.15	0.1972E+00	0.2899E+00	-9999.00
200000.	135.01	275.00	-35.47	0.1889E+00	0.2769E+00	-9999.00
201000.	140.09	275.00	-35.15	0.1810E+00	0.2649E+00	-9999.00
202000.	145.14	274.00	-35.15	0.1735E+00	0.2540E+00	-9999.00
203000.	151.90	274.00	-34.15	0.1662E+00	0.2423E+00	-9999.00
204000.	156.96	274.00	-34.98	0.1593E+00	0.2330E+00	-9999.00
205000.	160.33	274.00	-37.21	0.1525E+00	0.2252E+00	-9999.00
206000.	163.71	274.00	-39.03	0.1461E+00	0.2174E+00	-9999.00
207000.	167.09	275.00	-39.15	0.1399E+00	0.2083E+00	-9999.00
208000.	168.77	275.00	-39.13	0.1339E+00	0.1993E+00	-9999.00
209000.	168.77	276.00	-39.63	0.1282E+00	0.1913E+00	-9999.00
210000.	165.39	277.00	-39.11	0.1227E+00	0.1826E+00	-9999.00
211000.	162.01	279.00	-38.15	0.1175E+00	0.1742E+00	-9999.00
212000.	158.63	280.00	-38.00	0.1125E+00	0.1667E+00	-9999.00
213000.	151.90	281.00	-37.15	0.1078E+00	0.1591E+00	-9999.00
214000.	143.44	281.00	-38.29	0.1032E+00	0.1531E+00	-9999.00
215000.	133.33	280.00	-38.49	0.9880E-01	0.1467E+00	-9999.00
216000.	124.90	279.00	-38.15	0.9460E-01	0.1402E+00	-9999.00
217000.	113.06	276.00	-36.73	0.9060E-01	0.1335E+00	-9999.00
218000.	101.25	272.00	-37.38	0.8680E-01	0.1283E+00	-9999.00
219000.	92.81	266.00	-38.15	0.8320E-01	0.1233E+00	-9999.00
220000.	86.06	257.00	-38.43	0.7960E-01	0.1181E+00	-9999.00
221000.	84.38	247.00	-40.76	0.7630E-01	0.1144E+00	-9999.00
222000.	87.76	237.00	-44.30	0.7300E-01	0.1111E+00	-9999.00

Table 5. STS-41 ascent atmospheric data tape (continued).

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
223000.	94.52	230.00	-48.71	0.6970E-01	0.1082E+00	-9999.00
224000.	104.63	225.00	-51.90	0.6660E-01	0.1049E+00	-9999.00
225000.	114.76	222.00	-54.93	0.6370E-01	0.1017E+00	-9999.00
226000.	124.90	221.00	-57.42	0.6070E-01	0.9802E-01	-9999.00
227000.	135.01	222.00	-60.10	0.5790E-01	0.9467E-01	-9999.00
228000.	145.14	223.00	-62.62	0.5500E-01	0.9101E-01	-9999.00
229000.	153.58	224.00	-64.15	0.5240E-01	0.8734E-01	-9999.00
230000.	162.01	226.00	-65.67	0.4990E-01	0.8378E-01	-9999.00
231000.	168.77	227.00	-66.24	0.4760E-01	0.8014E-01	-9999.00
232000.	173.82	229.00	-68.29	0.4530E-01	0.7703E-01	-9999.00
233000.	177.20	231.00	-70.29	0.4310E-01	0.7401E-01	-9999.00
234000.	178.90	234.00	-71.77	0.4100E-01	0.7093E-01	-9999.00
235000.	177.20	237.00	-73.29	0.3900E-01	0.6798E-01	-9999.00
236000.	175.52	240.00	-74.81	0.3700E-01	0.6499E-01	-9999.00
237000.	172.15	244.00	-76.15	0.3520E-01	0.6225E-01	-9999.00
238000.	168.77	247.00	-76.15	0.3350E-01	0.5924E-01	-9999.00
239000.	165.39	251.00	-76.84	0.3180E-01	0.5643E-01	-9999.00
240000.	158.63	255.00	-77.15	0.3020E-01	0.5368E-01	-9999.00
241000.	153.58	259.00	-77.15	0.2860E-01	0.5083E-01	-9999.00
242000.	146.82	263.00	-77.15	0.2720E-01	0.4834E-01	-9999.00
243000.	140.09	267.00	-77.15	0.2580E-01	0.4586E-01	-9999.00
244000.	133.33	271.00	-77.15	0.2450E-01	0.4355E-01	-9999.00
245000.	124.90	276.00	-76.77	0.2330E-01	0.4133E-01	-9999.00
246000.	118.14	281.00	-76.15	0.2210E-01	0.3908E-01	-9999.00
247000.	109.71	287.00	-76.15	0.2100E-01	0.3714E-01	-9999.00
248000.	102.95	292.00	-77.10	0.2000E-01	0.3554E-01	-9999.00
249000.	96.19	297.00	-77.15	0.1900E-01	0.3377E-01	-9999.00
250000.	87.76	303.00	-77.15	0.1800E-01	0.3199E-01	-9999.00
251000.	81.00	309.00	-77.67	0.1710E-01	0.3047E-01	-9999.00
252000.	74.25	316.00	-78.20	0.1620E-01	0.2895E-01	-9999.00
253000.	65.81	322.00	-79.72	0.1540E-01	0.2774E-01	-9999.00
254000.	59.06	330.00	-81.15	0.1460E-01	0.2649E-01	-9999.00
255000.	50.62	339.00	-82.15	0.1390E-01	0.2535E-01	-9999.00
256000.	43.86	350.00	-83.29	0.1310E-01	0.2404E-01	-9999.00
257000.	38.81	3.00	-84.82	0.1250E-01	0.2312E-01	-9999.00
258000.	35.43	18.00	-86.71	0.1180E-01	0.2205E-01	-9999.00
259000.	33.76	35.00	-87.87	0.1120E-01	0.2106E-01	-9999.00
260000.	33.76	53.00	-89.15	0.1060E-01	0.2007E-01	-9999.00
261000.	37.14	69.00	-89.91	0.1000E-01	0.1901E-01	-9999.00
262000.	40.52	84.00	-91.15	0.9500E-02	0.1818E-01	-9999.00
263000.	45.57	96.00	-91.15	0.9000E-02	0.1723E-01	-9999.00
264000.	52.33	106.00	-91.49	0.8500E-02	0.1630E-01	-9999.00
265000.	59.06	115.00	-92.15	0.8000E-02	0.1540E-01	-9999.00
266000.	67.52	122.00	-92.15	0.7600E-02	0.1463E-01	-9999.00
267000.	75.95	128.00	-92.15	0.7200E-02	0.1386E-01	-9999.00
268000.	86.06	134.00	-92.15	0.6800E-02	0.1309E-01	-9999.00
269000.	94.52	138.00	-92.15	0.6400E-02	0.1232E-01	-9999.00
270000.	104.63	142.00	-91.15	0.6100E-02	0.1168E-01	-9999.00
271000.	114.76	146.00	-90.14	0.5700E-02	0.1085E-01	-9999.00
272000.	124.90	150.00	-87.23	0.5400E-02	0.1012E-01	-9999.00

Table 5. STS-41 ascent atmospheric data tape (continued).

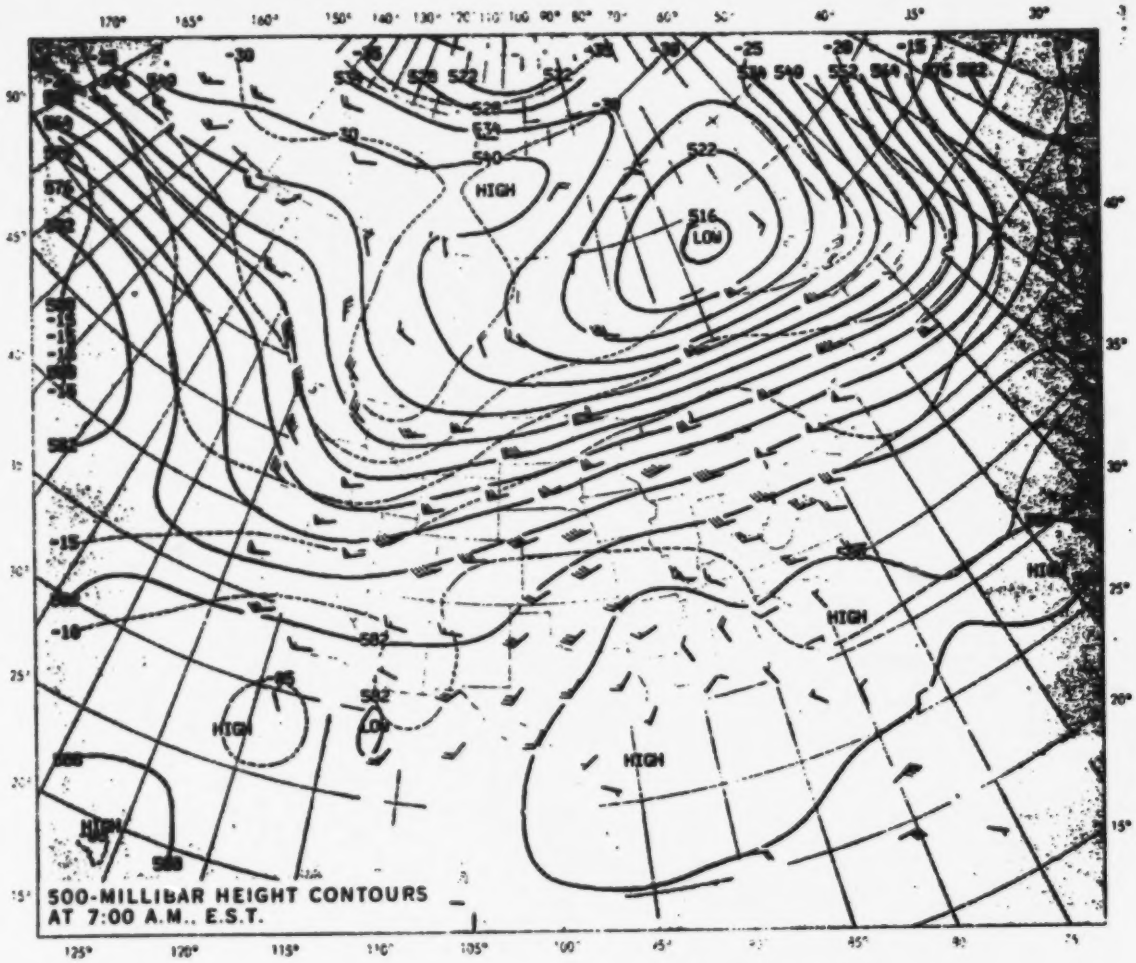
ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
274000.	106.81	153.76	-86.02	0.5035E-02	0.9374E-02	-9999.00
277000.	81.02	162.47	-84.19	0.4534E-02	0.8359E-02	-9999.00
280000.	58.73	178.45	-82.37	0.4083E-02	0.7455E-02	-9999.00
283000.	45.44	207.87	-80.55	0.3676E-02	0.6649E-02	-9999.00
286000.	49.08	243.86	-78.73	0.3310E-02	0.5931E-02	-9999.00
289000.	49.69	249.32	-79.00	0.2830E-02	0.5078E-02	-9999.00
292000.	50.75	254.55	-79.26	0.2430E-02	0.4366E-02	-9999.00
295000.	52.21	259.57	-79.52	0.2080E-02	0.3742E-02	-9999.00
298000.	103.12	269.74	-78.21	0.1780E-02	0.3181E-02	-9999.00
301000.	164.94	273.31	-76.74	0.1520E-02	0.2696E-02	-9999.00
304000.	228.43	274.92	-75.26	0.1310E-02	0.2306E-02	-9999.00
307000.	287.52	275.79	-73.79	0.1120E-02	0.1957E-02	-9999.00
310000.	333.56	276.32	-72.32	0.9590E-03	0.1664E-02	-9999.00
313000.	355.23	276.54	-70.69	0.8220E-03	0.1414E-02	-9999.00
316000.	364.97	276.53	-68.84	0.7060E-03	0.1204E-02	-9999.00
319000.	366.94	276.52	-66.99	0.6070E-03	0.1026E-02	-9999.00
322000.	358.18	276.51	-65.14	0.5210E-03	0.8726E-03	-9999.00
325000.	334.72	276.48	-63.30	0.4480E-03	0.7437E-03	-9999.00
328000.	291.71	276.45	-61.45	0.3840E-03	0.6319E-03	-9999.00
331000.	297.02	276.44	-58.16	0.3310E-03	0.5363E-03	-9999.00
334000.	297.02	276.38	-54.83	0.2840E-03	0.4532E-03	-9999.00
337000.	287.00	276.29	-51.49	0.2450E-03	0.3850E-03	-9999.00
340000.	263.29	276.15	-48.16	0.2100E-03	0.3252E-03	-9999.00
343000.	221.21	275.89	-44.83	0.1810E-03	0.2762E-03	-9999.00
346000.	191.54	276.02	-40.34	0.1570E-03	0.2349E-03	-9999.00
349000.	186.39	275.70	-34.72	0.1370E-03	0.2002E-03	-9999.00
352000.	173.58	275.21	-29.11	0.1190E-03	0.1699E-03	-9999.00
355000.	150.64	274.38	-23.49	0.1040E-03	0.1451E-03	-9999.00
358000.	114.39	272.65	-17.87	0.9090E-04	0.1240E-03	-9999.00
361000.	63.35	272.52	-12.15	0.7940E-04	0.1060E-03	-9999.00
364000.	57.71	270.03	-3.57	0.7130E-04	0.9214E-04	-9999.00
367000.	49.08	265.78	5.01	0.6410E-04	0.8028E-04	-9999.00
370000.	37.14	256.98	13.59	0.5750E-04	0.6986E-04	-9999.00
373000.	23.44	231.88	22.18	0.5150E-04	0.6075E-04	-9999.00
376000.	22.93	165.92	30.76	0.4610E-04	0.5284E-04	-9999.00
379000.	22.41	125.95	40.35	0.4180E-04	0.4645E-04	-9999.00
382000.	23.20	129.20	51.00	0.3830E-04	0.4116E-04	-9999.00
385000.	24.18	132.20	61.99	0.3520E-04	0.3659E-04	-9999.00
388000.	25.29	135.21	73.29	0.3240E-04	0.3258E-04	-9999.00
391000.	26.57	137.90	84.87	0.3000E-04	0.2919E-04	-9999.00
394000.	28.01	140.51	96.71	0.2780E-04	0.2618E-04	-9999.00
397000.	29.58	142.89	108.76	0.2580E-04	0.2353E-04	-9999.00
400000.	31.27	145.13	121.00	0.2410E-04	0.2130E-04	-9999.00



Surface synoptic map at 1200 u.t. October 6, 1990—isobaric, frontal, and precipitation patterns are shown in standard symbolic form.

Figure 1. Surface synoptic chart 13 min after the launch of STS-41.

ORIGINAL PAGE IS
OF POOR QUALITY



500-mb height
Contours at 1200 u.t.
October 6, 1990
Continuous lines indicate height contours at feet above sea level.
Dashed lines are isotherms in degrees centigrade. Arrows show wind direction and speed at the 500-mb level.

Figure 2. 500-mb map 13 min after the launch of STS-41.

ORIGINAL PAGE IS
OF POOR QUALITY

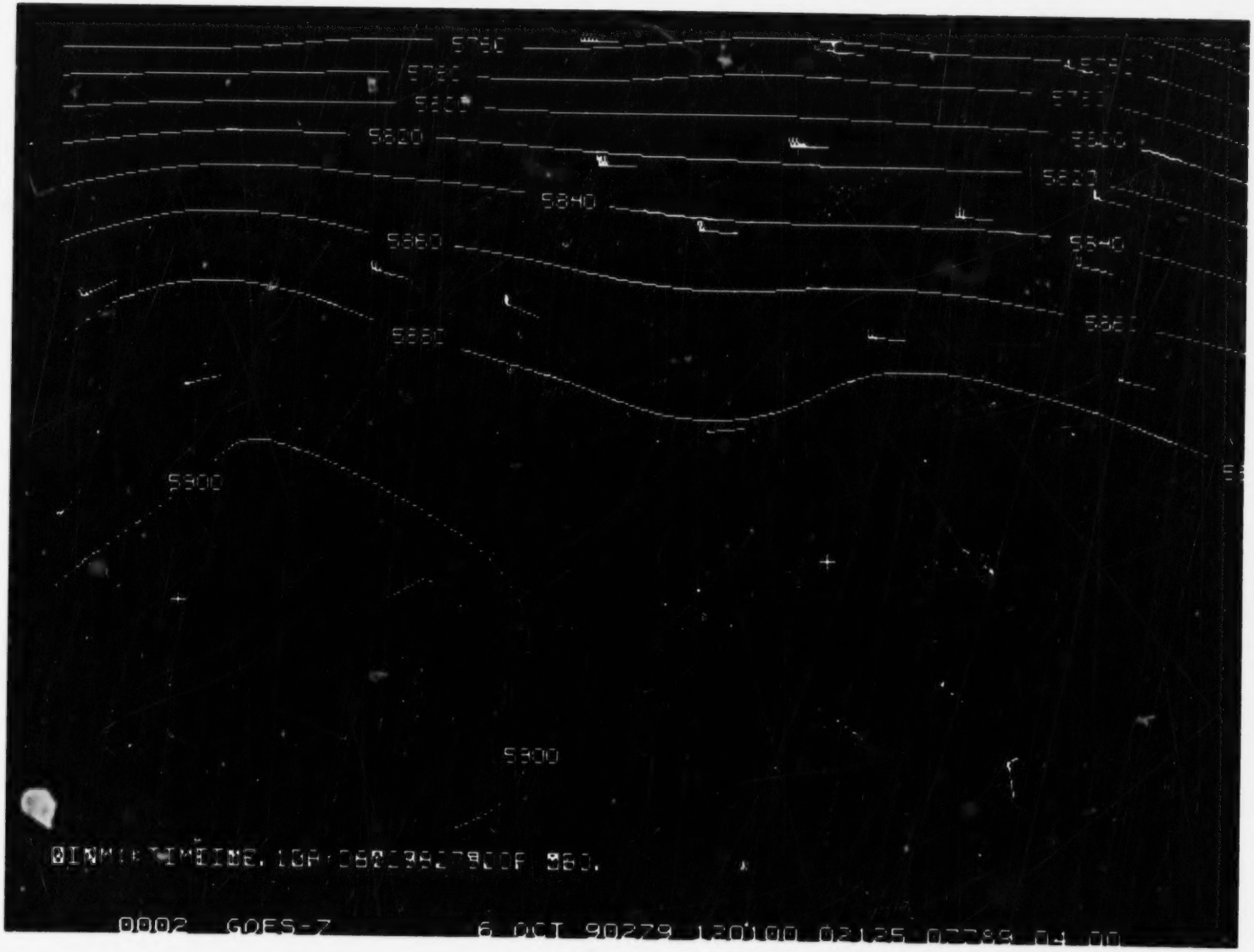


Figure 3. GOES-7 visible imagery of cloud cover 14 min after the launch of STS-41 (1201 u.t., October 6, 1990). 500-mb heights (meters) and wind barbs are also included for 1200 u.t.

ORIGINAL PAGE IS
OF POOR QUALITY

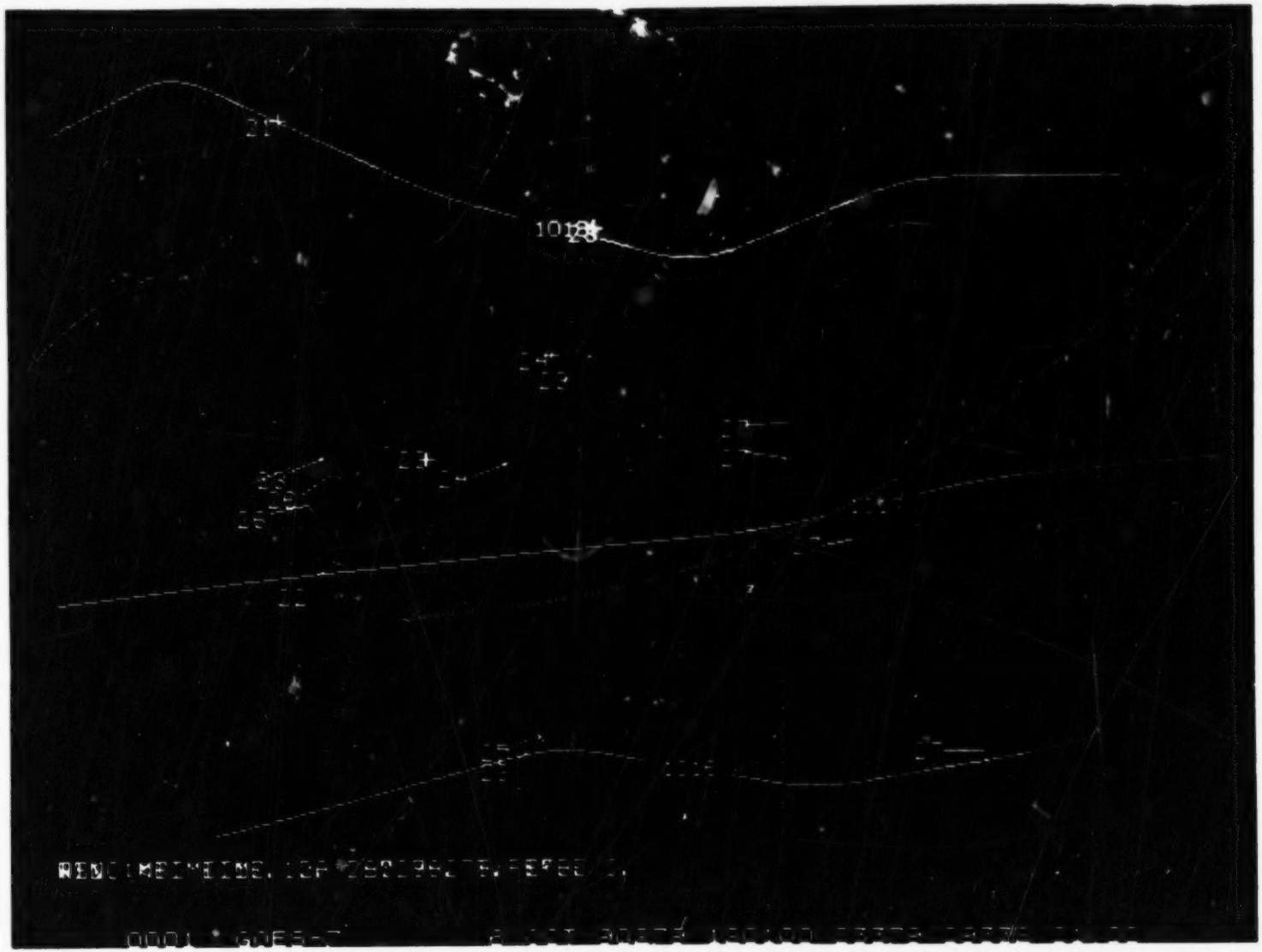


Figure 4. Enlarged view of GOES-7 visible imagery of cloud cover taken 14 min after the launch of STS-41 (1201 u.t., October 6, 1990). Surface temperatures, isobaric parameters, and wind barbs for 1200 u.t. are also included.

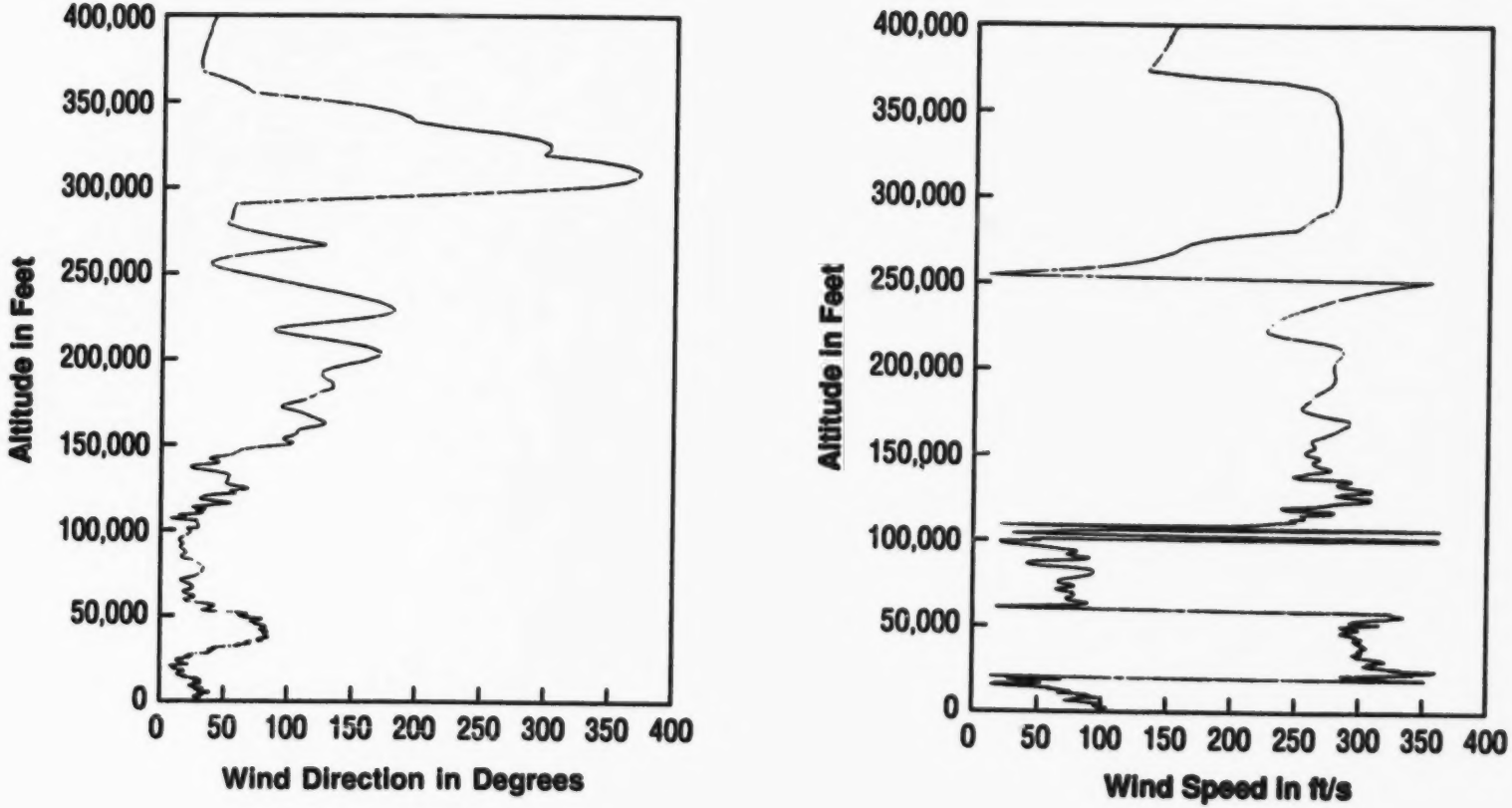


Figure 5. Scalar wind speed and direction at launch time of STS-41.

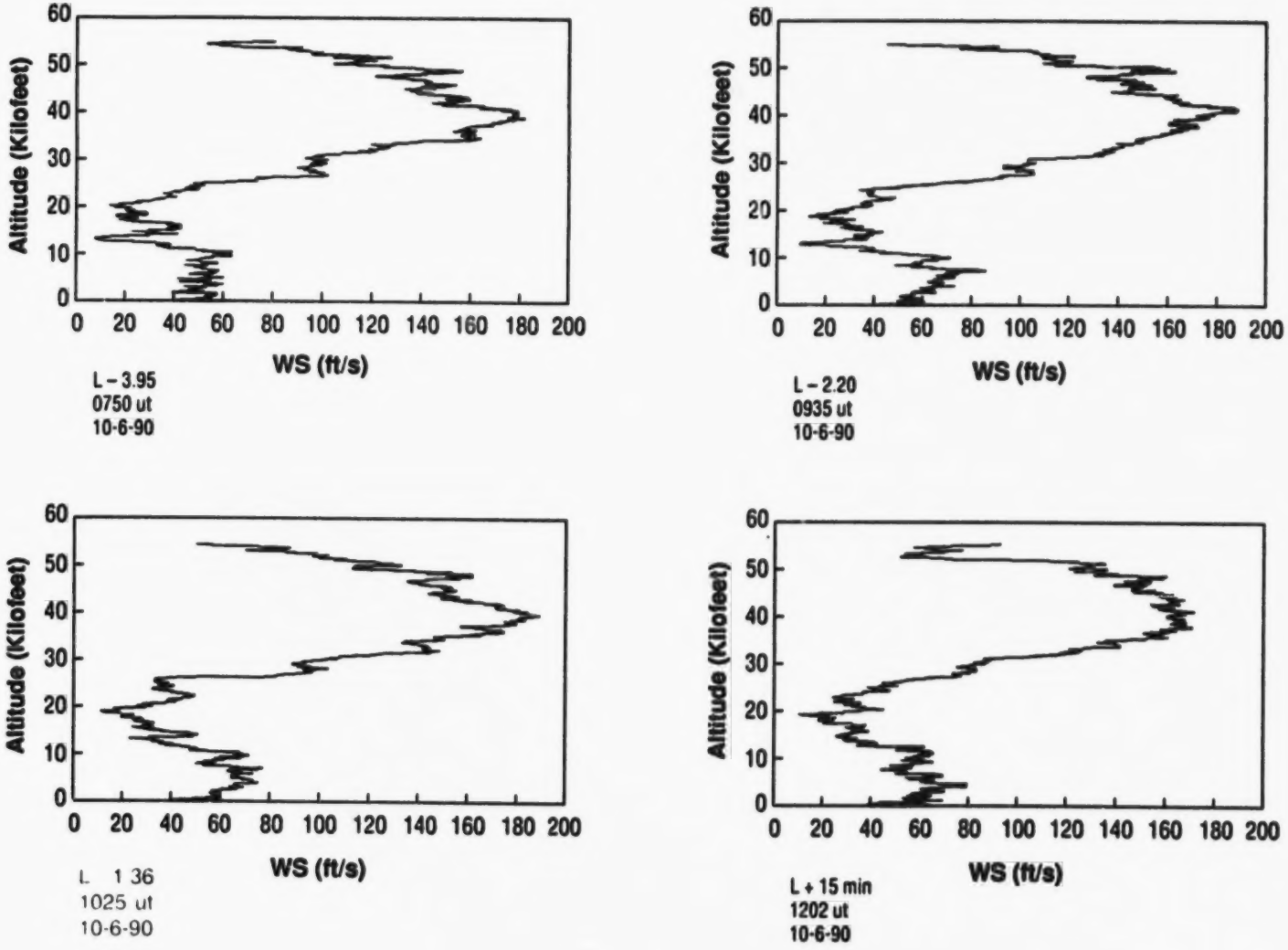


Figure 6. STS-41 prelaunch/launch Jimsphere-measured wind speeds (ft/s).

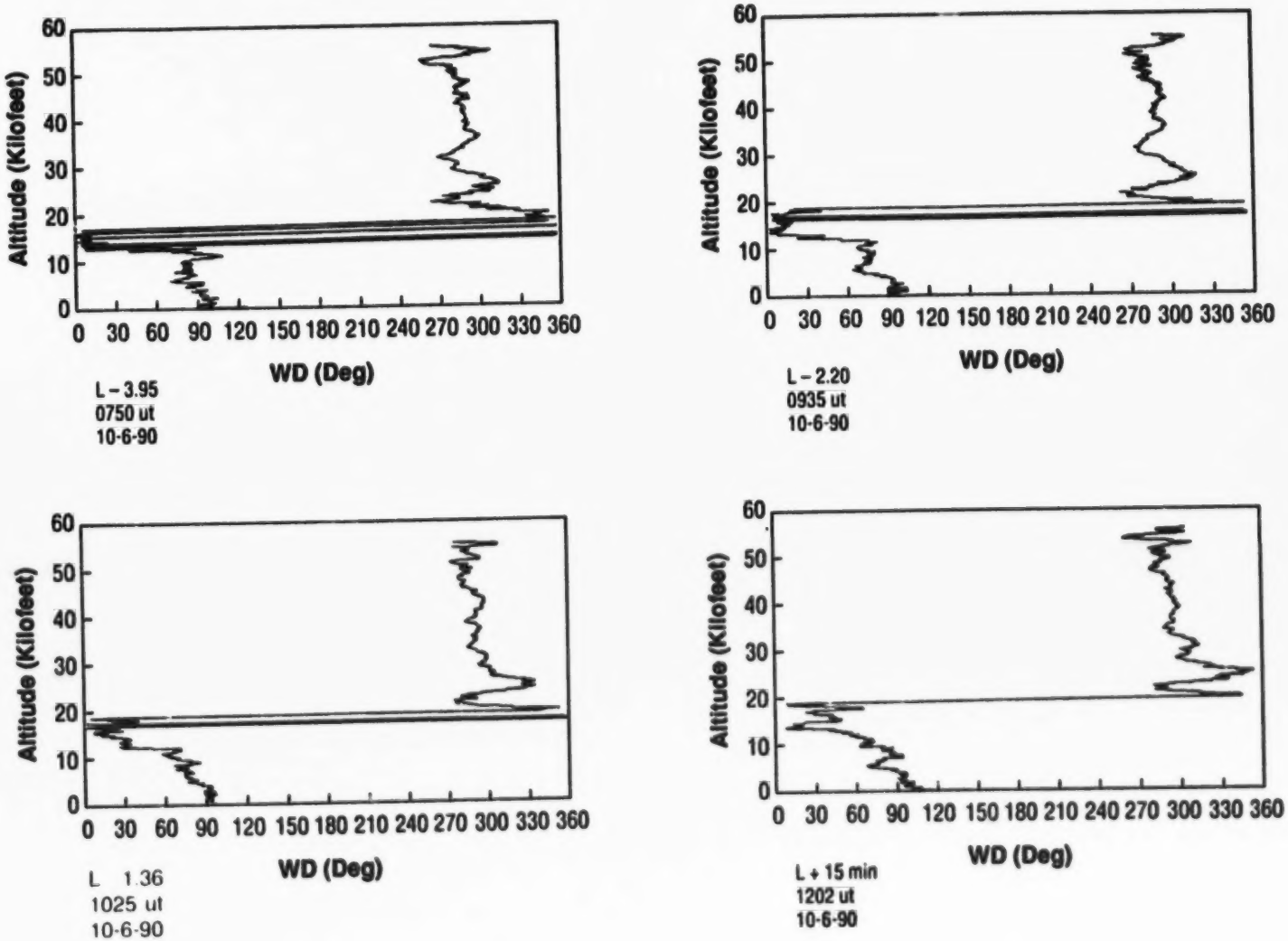


Figure 7. STS-41 prelaunch/launch Jimsphere-measured wind directions (degrees).

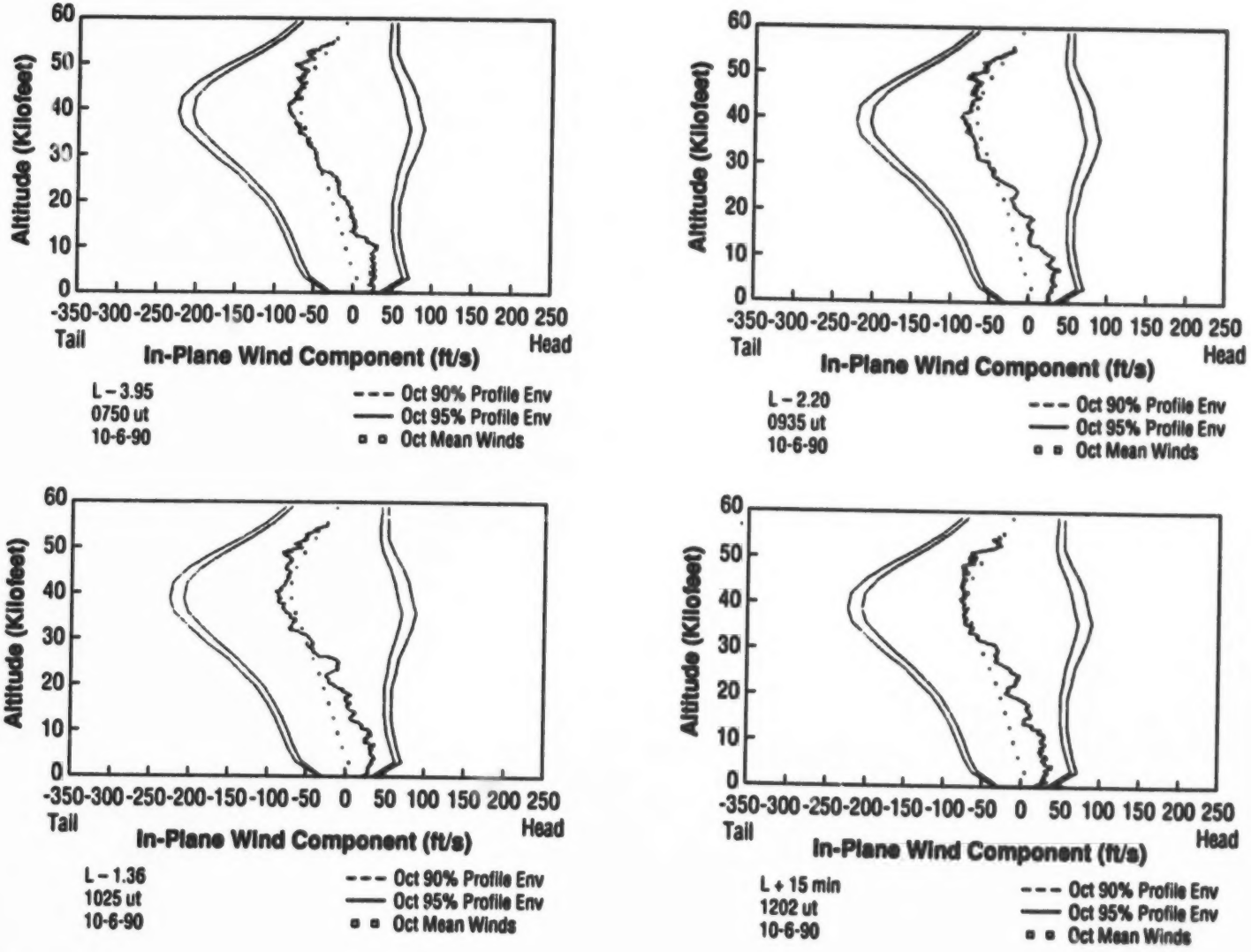


Figure 8. STS-41 prelaunch/launch Jimsphere-measured in-plane component winds (ft/s). Flight azimuth = 90 degrees.

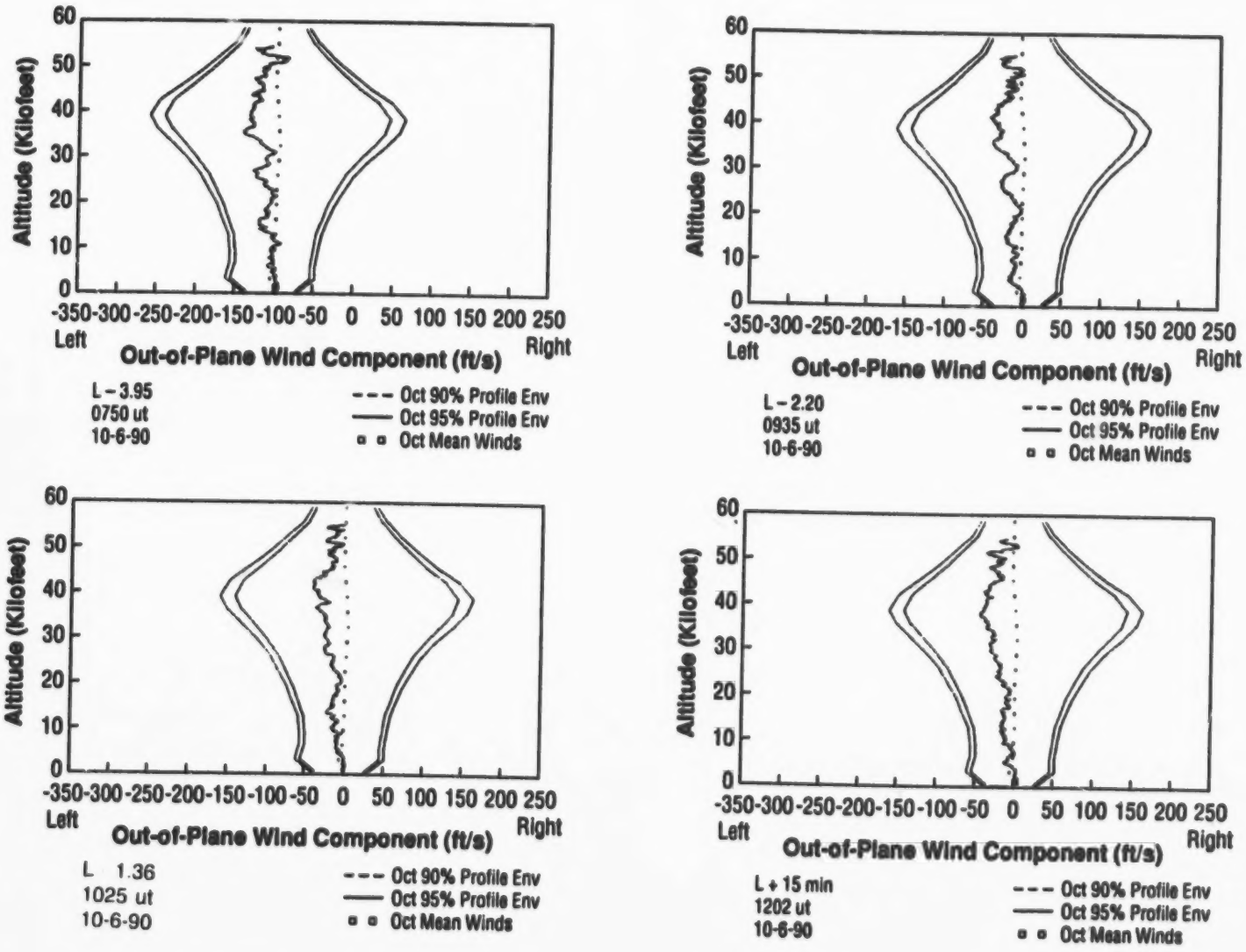


Figure 9. STS-41 prelaunch/launch Jimsphere-measured out-of-plane component winds (ft/s). Flight azimuth = 90 degrees.

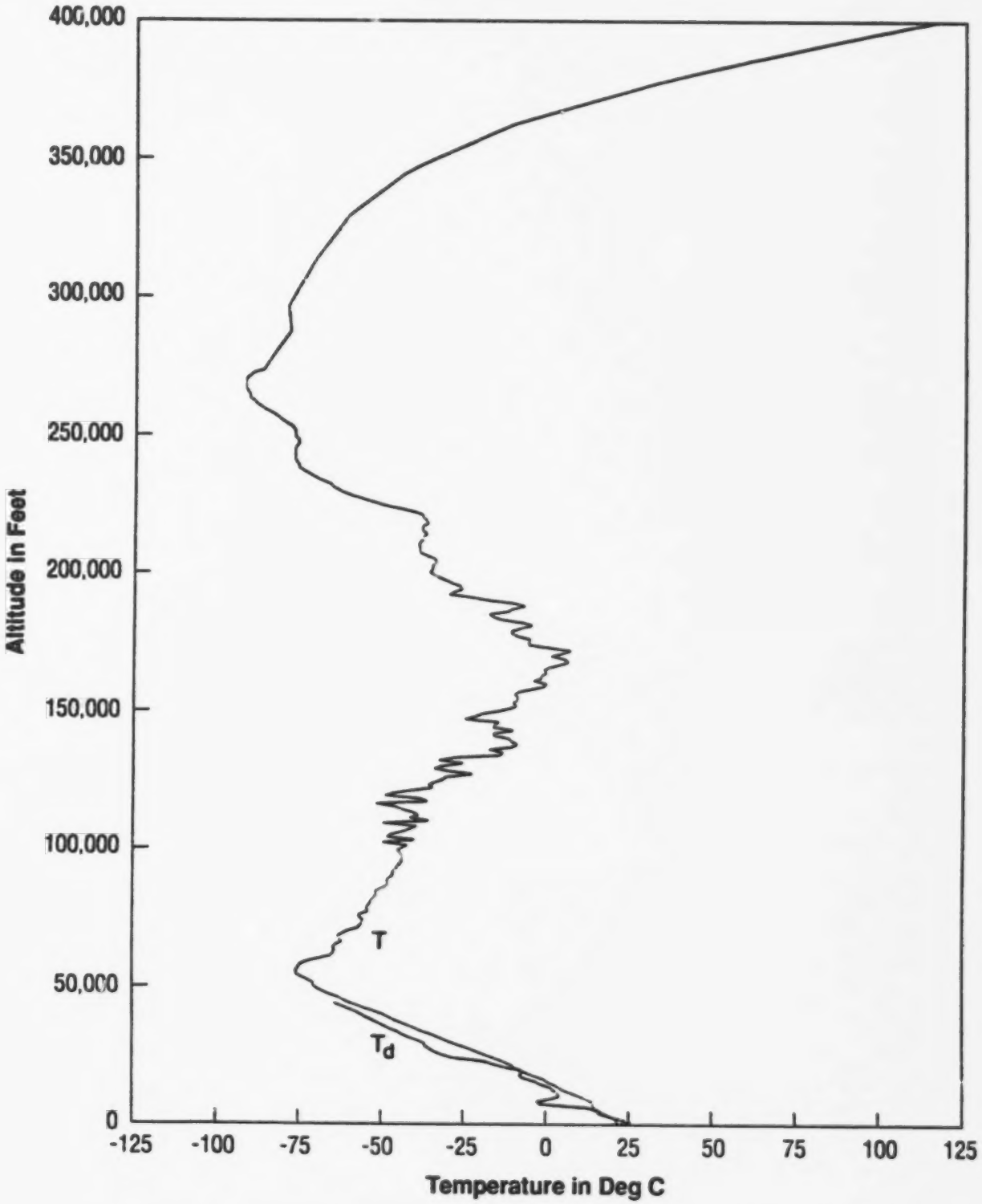


Figure 10. STS-41 temperature profiles versus altitude for launch (ascent).

REFERENCES

1. Saturn Flight Evaluation Working Group: Saturn Launch Vehicle Flight Evaluation Report – Appendix A – Atmosphere (A separate report is prepared for each Saturn vehicle launch operation). George C. Marshall Space Flight Center, Alabama.

2. Johnson, D.L.: Summary of Atmospheric Data Observations for 155 Flights of MSFC/ABMA Related Aerospace Vehicles. NASA TM X-64796, December 5, 1973.

3. Johnson, D.L.: Atmospheric Environment for ASTP (SA-210) Launch. NASA TM X-64990, February 1976.

4. Johnson, D.L., Jasper, G., and Brown, S.C.: Atmospheric Environment for Space Shuttle (STS-1) Launch. NASA TM 82436, July 1981.

5. Johnson, D.L. and Brown, S.C.: Atmospheric Environment for Space Shuttle (STS-2) Launch. NASA TM 82463, December 1981.

6. Johnson, D.L., Brown, S.C., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-3) Launch. NASA TM 82480, April 1982.

7. Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-4) Launch. NASA TM 82498, July 1982.

8. Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-5) Launch. NASA TM 82515, March 1983.

9. Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-6) Launch. NASA TM 82529, May 1983.

10. Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-7) Launch. NASA TM 82542, July 1983.

11. Johnson, D.L., Hill, C.K., Turner, R.E., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-8) Launch. NASA TM 82560, October 1983.

12. Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-9) Launch. NASA TM 82572, January 1984.

13. Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-11) Launch. NASA TM 82580, March 1984.

14. Johnson, D.L., Hill, C.K., Jasper, G., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-13) Launch. NASA TM 82588, May 1984.

15. Johnson, D.L., Hill, C.K., Jasper, G., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-41D) Launch. NASA TM 86484, October 1984.

16. Johnson, D.L., Hill, C.K., Jasper, G., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-41G) Launch. NASA TM 86486, November 1984.

17. Johnson, D.L., Jasper, G., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-51A) Launch. NASA TM 84697, December 1984.

18. Jasper, G.L., Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-51C) Launch. NASA TM 86508, April 1985.

19. Jasper, G.L., Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-51D) Launch. NASA TM 86524, June 1985.

20. Jasper, G.L., Johnson, D.L., Hill, C.K., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-51B) Launch. NASA TM 86525, July 1985.

21. Jasper, G.L., Johnson, D.L., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-51L) Launch. NASA TM 86577, December 1986.

22. Jasper, G.L., Johnson, D.L., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-26) Launch. NASA TM 100359, March 1989.

23. Jasper, G.L., Johnson, D.L., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-27) Launch. NASA TM 100370, May 1989.

24. Jasper, G.L., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-29) Launch. NASA TM 100376, July 1989.

25. Jasper, G.L., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-30) Launch. NASA TM 100381, September 1989.

26. Jasper, G. L., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-28) Launch. NASA TM 100386, July 1990.

27. Jasper, G.L., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-34) Launch. NASA TM 100396, December 1989.

28. Jasper, G.L., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-33) Launch. NASA TM 100399, March 1990.

29. Jasper, G.L., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-32) Launch. NASA TM 100400, March 1990.

30. Jasper, G.L., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-36) Launch. NASA TM 100403, May 1990.

31. Jasper, G.L., and Batts, G.W.: Atmospheric Environment for Space Shuttle (STS-31) Launch. NASA TM 103508, June 1990.

32. Justus, C.G., et al.: The NASA/MSFC Global Reference Atmosphere Model – Mod 3 (with Spherical Harmonic Wind Model). NASA CR-3256, March 1980.

APPROVAL

ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-41) LAUNCH

By G.L. Jasper and G.W. Batts

The information in this report has been reviewed for technical content. Review of any information concerning Department of Defense or nuclear energy activities or programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

E. Tandberg-Hanssen

E. TANDBERG-HANSSEN
Director, Space Science Laboratory

☆ U.S.GOVERNMENT PRINTING OFFICE 1991–531-081/40019